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ENTOMOLOGIST'S GAZETTE

January, 1956.

Vol. 7, No. 1.

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NEWS AND VIEWS

During this year will be held the TENTH INTERNATIONAL CONGRESS OF ENTOMOLOGY. It will be held in Montreal, Canada, from 17th to 25th August, at MCGILL UNIVERSITY and the UNIVERSITY OF MONTREAL.

It is appropriate that the venue for this meeting is in a country which is from the standpoint of professional entomology, in the forefront of the countries of the British Commonwealth, and possibly of the world. Many of the best entomologists have been and are being attracted by the excellent conditions of work and prospects, and many of the visitors attending the Congress will, for a time, be renewing old friendships and visiting past colleagues.

For the information of those who will be fortunate enough to be able to attend the Congress, the Secretary is J. A. DOWNES, Esq., Division of Entomology, Science Service Building, Ottawa, Ontario, to whom they should write for further information.

In this issue we publish an account of a very interesting addition to the British list; *Xanthorhoë biriviata* Bkh.

The authors of this account ask that any additional records should be sent to the Editor in confidence. We willingly accept this responsibility and can confirm from personal experience (Messrs. W. E. Minnion and B. S. Goodban having kindly conducted the Editor to the small area where they found the insect) that the breed-

ing area is so vulnerable that it would be unwise to divulge it, even in the most approximate terms, until it is proved that the insect is found over a considerably wider area or has other footholds in this country. The main reason for this caution is not a suspicion that their fellow entomologists are hardened criminals whose only thought would be the extermination of the species, but that the foodplant is so tender that any extensive tramping around in the restricted locality might quite easily damage the Balsam very seriously.

If the insect is found elsewhere the original locality will then, of course, be revealed.

From a remark passed recently by a subscriber it appears that it is not generally appreciated that the *Gazette* is run on a non-profit making basis. Everything we get from subscriptions, advertisements or any other source is spent on the improvement of the *Gazette*; even most of the costs of postages are privately borne.

We do get very occasional donations, but we must rely mainly on subscriptions for our revenue. Please help to increase the circulation, for by doing so you are helping to improve the standard of the *Gazette* for yourself. The subscription rate of £1 per year is very low, and we will do our best to keep it low—although the recent rise in postage rates is an indication that it may be difficult to keep it at £1 after the end of 1956. In this connection we would be interested to hear the views of subscribers. Would it generally be considered better to raise the subscription (let us say to 25s.) in 1957, or to keep it at £1 and reduce the number of pages?

We are already receiving more material than we can publish—but a substantial increase in the number of subscribers, or in paid advertisements, would probably enable us to avoid an increase in subscription rate *and* increase the number of pages.

Please help, if you can, to enrol that hesitant friend as a subscriber to the *Gazette*. Give him a year's subscription—he will certainly continue to subscribe.

ERRATA

Vol. 6, part 3. We have been asked by the author to make the following corrections:—

Page 219, line 41: Warren to be Wrnke.

Page 221, line 11: *lutulemia* to be *lutulenta*.

Page 221, line 27: Drank to be Wrnke.

Page 221, line 45: Durr, to be Burr.

Page 222, line 2: Durr. to be Burr.

Page 222, line 37: Warren to be Wrnke.

Page 222, line 39: Fryer to be Freyer.

(Wrnke = Warnecke.)

XANTHORHOË BIRIVIATA BKH., IN SOUTHERN ENGLAND (LEP: GEOMETRIDAE)

By W. E. MINNION AND B. S. GOODBAN

Illustrated by Plates One and Two

On 31st May, 1955, we were exploring some ground which was new to us with a view to finding *Eupithecia palustraria* Dbld., which had been reported to us as occurring in the locality. We had little luck with this particular insect, although we found one, but in the course of our search we netted a geometrid with which we were quite unfamiliar. It seemed that it might be a form of *Euphyia unangulata* Haw. or *Epirrhoë alternata* Müll., but the colour of the markings was much more of a purplish brown than black and the whole appearance of the moth seemed different. We soon found that it was plentiful and flying freely in the sunlight and we took about 20.

Having got the specimens home we searched our books for a clue as to the moth's identity, but without success.

A few days later (2nd June) we had the opportunity to make another journey to the site in the evening and again the moth was flying freely at dusk and about half an hour after dark.

We were by now hopeful that we had stumbled on to something new, and as we were expecting to visit Tring about the end of June we decided to take the moths with us to compare them with the 'carpets' in the collection there. It was at once apparent that they were in fact a different species, and reference to the plates in 'Seitz' suggested that they were *Xanthorhoë biriviata* Bkh., (*pomoeriararia* Eversmann). When, in the text, it was stated 'larvae on Impatiens' we felt that we had the confirmation we needed, as the American species *Impatiens fulva* was very plentiful in the locality where the moth was discovered.

The identity was confirmed by Mr. D. S. Fletcher at South Kensington, and in the series in the Natural History Museum were examples of the Summer form ab. *aestiva* Fuchs.

On 20th July we had another chance to visit the site and we immediately found the moth again, and the specimens taken approximated to the examples of ab. *aestiva*, in which the ground colour is very much darker than in the Spring form. It was not until 12th August that another search was possible, but on that date there were still plenty of moths, though mainly in worn condition.

It was unfortunate that we were not close enough to the locality to carry out a continuous investigation throughout the summer. Once the identity of the food-plant had been discovered a few larvae were found, but it was evidently too late then (mid July) for the first lot of larvae, as the summer brood of moths was then emerging. Only

two pupae were obtained and these appear to be lying over until next year.

From the summer moths a fair number of ova were obtained. These, laid in captivity, suggest that the moths lay mainly on the undersides of the leaves in twos and threes and away from the edges, but a few were laid, usually singly, on the stems. The colour of the egg is light green, corresponding with the colour of the leaves. The larvae emerged in seven days and commenced feeding low down on potted plants, the small larvae eating small holes in the leaves. At this stage and through the first two or three instars the bulk of the larvae were green, though a few were light brown right from the time of emerging from the egg. At first they are quite plain and do not appear to develop the pattern illustrated in the photographs until the last two larval instars, when the somewhat tapered form becomes evident. When this pattern develops the colour is usually a dark greenish brown, with green or brown below the spiracular line. In the last instar the brown is more noticeable. A few larvae retain their light green colour throughout and only the prominent dots in the pattern appear. These green larvae seem to turn buff when quite fully fed, one found in the wild being almost white, but still with the dots, which appear to be constant.

On 21st August, an expedition in search of the larva in the wild was planned, and it proved to be easy to find. In the earlier stages, when still green, it seems to rest mainly on the undersides of the leaves along the ribs and rather lower on the plants than when it is larger. When in its mature colouring, however, it was found resting flat upon the upper surfaces of the leaves, higher up on the plants, and usually on the midrib, with its head to the apex of the leaf. At all stages one or two larvae were found resting on the stems or between the leaf stalks and the leaf. When searching for larvae, the similarity of the mature colouring of the larvae to that of the rolled edge of a leaf and of the immature colouring to the unripe seed pods was quite noticeable. When first disturbed the larva arches itself slightly, but on further disturbance it rolls up into a tight coil and drops off the leaf. It does not appear to spin any retaining thread.

On a further visit in September, immediately after rain, it was interesting to note that the mature larvae occupied their usual resting position on the midrib, with head to the leaf's apex but on the underside of the leaf. No larvae were found on plants growing in the open without some shade.

The larger larvae seem to eat only a portion of each leaf, feeding now from the edges as distinct from their earlier habit, with the result that where larvae are plentiful the Balsam takes on a somewhat ragged appearance. Apparently they feed mainly at night.

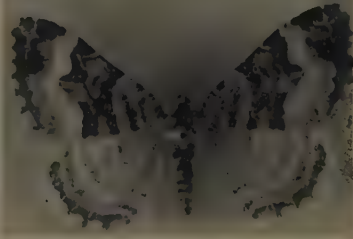
In cages, larvae spun cocoons among litter on the floor, but when on potted plants a quite substantial cocoon was formed just below the surface of the earth. This is probably the natural situation for it,



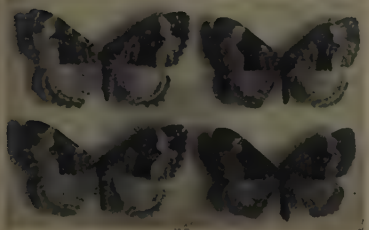
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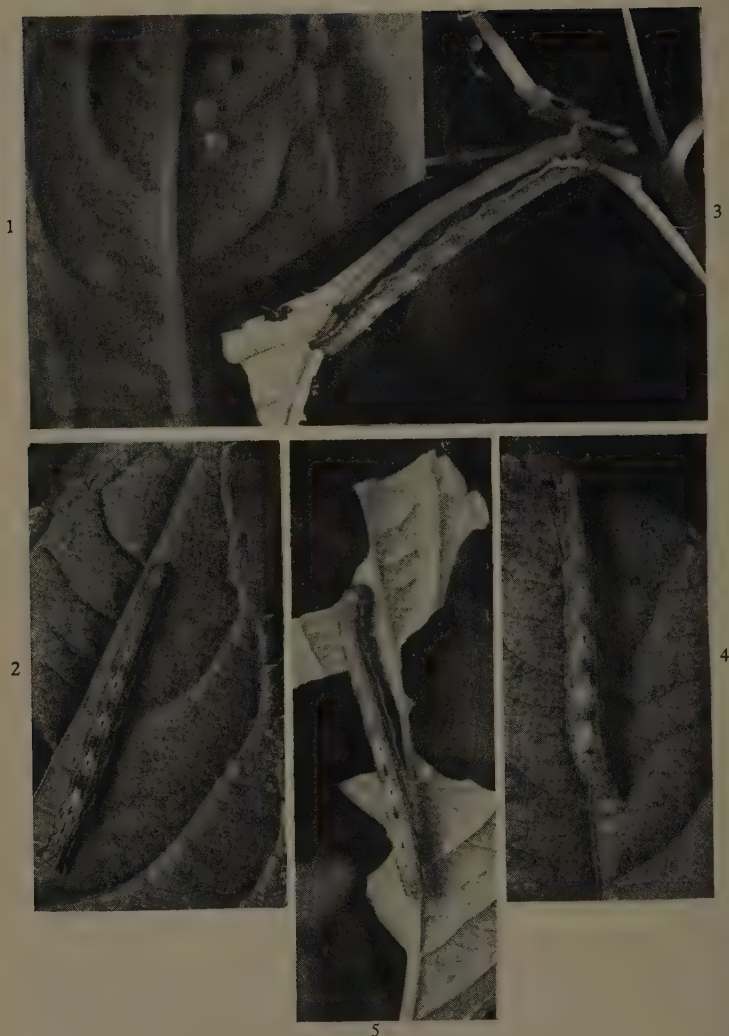


11

9

10

1, *X. quadrifasciata* Clerck x 2. 2, *E. alternata* Müll. x 2. 3, *E. unangulata* Haw. x 2. 4, *X. biriviata* Bkh. ab *aestiva* Fuchs x 2. 5 and 6, *X. biriviata* x 2. 7 and 8, *X. biriviata* natural size. 9 and 10, ditto, ab. *aestiva* natural size. 11, ditto, pupa in cocoon x 2.



XANTHORHOË BIRIVIATA BKH.

- 1, Eggs, enlarged. To show position on leaf close to midrib.
2, 3, 4, 5, Larvae. x 2. To show different forms, and position on leaves.

and the fact that the natural habitat of the Balsam is very moist and may perhaps be flooded may account for the need of a reasonably tough cocoon.

The species appears to have a wide distribution over central and eastern Europe, and it occurs in southern Scandinavia, including Denmark; Holland, Belgium and France. It seems astonishing that it could have established itself over here without being previously observed, as it seems to fly freely in sunshine. It would appear that, on the Continent, its food-plant is mainly *Impatiens noli-me-tangere*, which occurs in this country principally in the north. The introduced species, *Impatiens fulva*, is fairly wide spread in the south of England, and it is hoped that where this species is well established the moth may perhaps be found. Another Balsam, *Impatiens parviflora*, which has a European distribution somewhat similar to that of the moth, is established in some southern counties and may possibly support the moth, though in the case of larvae reared on *fulva* and *parviflora*, those on *fulva* appeared to thrive better. This difference may, however, have resulted from the method of rearing, as those on *parviflora* were in normal cages or sleeved on potted plants, while those on *fulva*, which dies rapidly in water, were reared in tins in darkness. We do not yet know if the large pink flowered Balsam *Impatiens Roylei* is suitable for this species or whether some of the cultivated species could be used for rearing the moth.

It is possible that this species has been overlooked as a result of its being confused with other 'carpets' such as *Epirrhoë alternata* Müll., *Euphyia unangulata* Haw., or *Xanthorhoë quadrifasciata* Cl., and examples may exist in collections which are considered to be varieties of these species. Prout places the moth between *Xanthorhoë spadicearia* Schf., (*ferrugata* Stdg.) and *X. designata* Hufn., and some forms of *spadicearia*, illustrated in *De Danske Maalere*, by Dr. Skat Hoffmeyer, are not unlike *biriviata*.

Having regard to the fact that the area where the moth has been found is privately owned and of comparatively small extent, it would be very unfair to the owner of the land and still more unfair to the moth to give a precise locality for the species at least until further investigations have established whether or no the species has a more extensive distribution.

It should be emphasized that these notes are based on very limited experience of the species. In particular the notes on the larvae arise almost entirely from observation of the summer brood. As much detail as is possible at this stage has been included in the hope that field workers will, in the coming season, visit areas where *Impatiens* is well established and will pool any information as to their findings. In this connection negative as well as positive information will be of value in working out the distribution of the moth, and it is suggested that such information might be sent to the Editor on the understanding that nothing be disclosed without consent of the informant.

While searching for larvae one or two skins were found hanging limply from the food-plant, and, from those brought home, one cocoon of a parasite has been found, evidently hymenopterous.

If a locality for this moth is found and it is intended to search for and rear the larvae, it should be remembered that the Balsam is a very tender plant, and beating or sweeping for larvae would probably so damage the plants as to prevent them flowering, with the result that, being an annual, it would not reappear in quantity the next year. Further, unless a sufficient supply of Balsam is readily available, the larvae should not be taken, as the plant will not last more than an hour or two in water and only a little longer in tins. *I. parviflora* is much better in this respect than *I. fulva* and does last in water if put into it immediately it is picked.

It seems that many entomologists feel that any species occurring in this country should be known by an English name as well as by its scientific name. This being so, it is suggested that this insect should be referred to as the Balsam Carpet.

On one of the plates we have illustrated other species which might be confused with *X. biriviata*.

The best coloured illustrations (of both Spring and Summer broods) which we have seen are those in Dr. Skat Hoffmeyer's excellent book *De Danske Maalere*, Aarhus, 1952, which also gives a somewhat indifferent coloured figure of the larva.

In referring to this species in Continental literature it should be borne in mind that for a long period of years, and until very recently, it has been known, incorrectly, under the name of *pomoeraria* Eversmann, and most references, including Staudinger, Seitz, Kirby, Hofmann, Spuler, Culot, etc., will be found under his name.

APATELE AURICOMA (SCHIFF.) IN THE ISLE OF WIGHT. (LEP: CARADRINIDAE).

Having read in E. B. Ford's *Moths*, p. 148, that 'In 1950 a specimen was found in Ham Street woods', and that 'One or two imagines have been taken on the Kent coast during this century', I feel that my belated record will be of interest. A ♂ in fresh condition was captured on a telegraph post at the top of Luccombe Chine, Isle of Wight, during the latter part of August, 1947. The specimen was exhibited on 14th July, 1948, at a meeting of the South London Entomological and Natural History Society, where Mr. E. W. Classey kindly confirmed my identification.

A. E. GARDNER.

29 Glenfield Road,
Banstead, Surrey.

BRITISH MITES OF THE GENERA *HALOLAE LAPS* BERLESE AND TROUESSART, AND *SAPROLAE LAPS* LEITNER (*GAMASINA-NEOPARASITIDAE*)

By K. H. HYATT, Department of Zoology, British Museum
(Natural History)

The object of the present paper is to revise the British species of the genera *Halolaelaps* and *Saproloelaps* (Gamasina, Neoparasitidae). The characteristics of the family Neoparasitidae and keys to the genera are given by Evans (1956).

The genus *Halolaelaps* was proposed by Berlese and Trouessart (1889) for an intertidal species of gamasid mite, *H. glabriusculus*. Halbert (1915), in his work on the acarine fauna of Clare Island, considered *glabriusculus* to be a synonym of *Gamasus marinus* Brady, 1875. This author also described a second species, *Haloloelaps celticus* from under stones between tide marks. Recently Evans (1954) added a third species *Halolaelaps nodosus* Willmann, 1952, to the British fauna.

The genus *Saproloelaps* was proposed by Leitner (1946) for *S. subtilis* Leitner, collected in dung in Austria. In addition she described three other species. The occurrence of this genus in Britain is here recorded for the first time.

Family NEOPARASITIDAE Oudemans, 1939

Genus *Halolaelaps* Berlese and Trouessart.

1889, *Halolaelaps* Berlese, A., and Trouessart, E. *Bull. Bibl. Sci. Oest* 2, 2: 122.

Dorsal shield divided in both sexes and bearing simple, pilose or spiculate setae. In the female, sternal shield narrow, not fused with the endopodals; genital shield with one pair of setae; anal shield widely removed from the genital. Male with ventri-anal shield. Peritreme variable in length. Stigma situated opposite the anterior edge of coxa IV. Metapodal shields usually well developed. Chelicerae chelate-dentate. Spermatophoral process free distally. Specialised seta on palptarsus with three prongs. Coxa II unarmed in both sexes; legs II, III and occasionally I and IV armed in the male. Type species: *Halolaelaps glabriusculus* Berlese and Trouessart, 1889 = *Gamasus marinus* Brady, 1875.

Key to the British species of *Halolaelaps* Berlese and Trouessart

1. Peritreme reduced in length and not extending to the posterior margin of coxa I..... 2
 - Peritreme not reduced; extending beyond coxa I..... 3
2. Peritreme extending to the middle of coxa III (Figs. 32 and 38); anterior margin of postero-dorsal shield incised in the female,

entire in the male; ventri-anal shield in the male with paired sclerotised areas anteriorly (Fig. 38)....*Halolaelaps incisus* sp. nov.
 - Peritreme extending to the middle of coxa III (Figs. 23 and 24); anterior margin of postero-dorsal shield entire in both sexes; ventri-anal shield with stout tubercle (Fig. 26).....

.....*Halolaelaps nodosus* Willmann.

3. Dorsal setae simple or spinose (Fig. 1); posterior margin of antero-dorsal shield straight or slightly convex; tectum not produced into an elongate process (Fig. 4); rostral setae simple.....

.....*Halolaelaps marinus* (Brady).

- A number of the dorsal setae pilose or ciliate in their distal halves (Fig. 9); posterior margin of anterior dorsal shield strongly convex; tectum produced into elongate denticulate process (Fig. 18); rostral setae spatulate distally (Fig. 11).....

.....*Halolaelaps celticus* Halbert.

Halolaelaps marinus (Brady), 1875 (Figs. 1-8)

1875, *Gamasus marinus* Brady, G. S. Proc. zool. Soc. Lond. :307, figs.

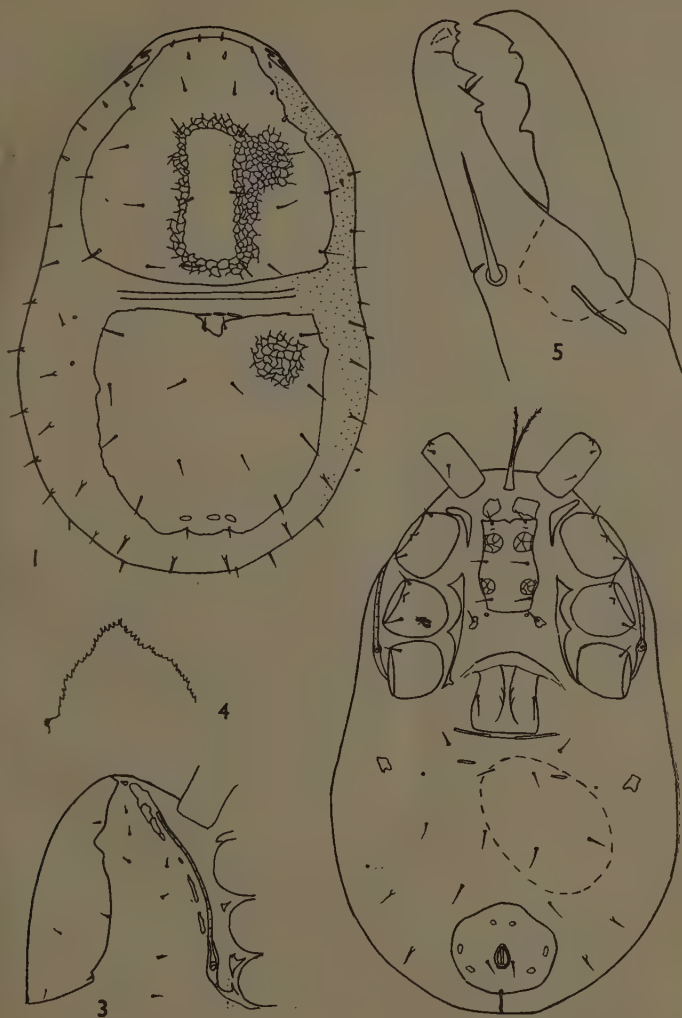
1889, *Halolaelaps glabriusculus* Berlese, A., and Trouessart, E. Bull. Bibl. Sci. Ouest 2, 2:122.

Female: The dorsum is completely covered by two shields of irregular outline (Fig. 1). The anterior shield, approximately $473 \times 495 \mu$, bears fourteen pairs of simple setae of which those around the anterior margin are short and subspinose. The posterior shield, approximately $407 \times 408 \mu$, is provided with only eight pairs of simple setae. The anterior margin, in the majority of the specimens examined, is broadly incised. Both shields have a scattered polygonal network. All the setae on the lateral interscutal membrane are simple.

The tritosternum is normal, with the lacinae weakly pilose (Fig. 2). The sternal shield has three pairs of setae and is characteristically ornamented with sub-circular reticulated areas between setae I and II, and II and III. The prae-endopodal shields are weakly developed. The endopodal shields are free and fragmented. The metasternal setae are free and lie on sclerotised bases posterior to the sternal shield. The minutely punctured genital shield is wedge-shaped and provided with a pair of setae. The anterior hyaline portion of the shield is poorly developed. Immediately posterior to the shield lies a sclerotised band, often fragmented. The anal shield, broader than long (approximately $165 \times 130 \mu$) is widely separated from the genital. The interscutal membrane between these shields bears six pairs of setae arranged 2-2-4-4. The metapodal shields are well developed and irregular in outline.

The peritreme extends to the level of the anterior margin of coxa I (Fig. 3). The peritrematal shield is poorly developed and not fused anteriorly with the dorsal shield. Similarly, the exopodal shields are weak and fragmented.

Ventrally the gnathosoma bears the normal four pairs of simple



Halolaelaps marinus (Brady), female.

Fig. 1, dorsum. Fig. 2, venter. Fig. 3, lateral. Fig. 4, tectum. Fig. 5, chelicera.

setae. The ventral groove is provided with seven rows of denticles. The pedipalpal setae are simple. The tectum (Fig. 4) is irregular in outline and minutely denticulate. The chelicerae are chelate-dentate; the movable digit has three, rarely four, well-developed teeth and the fixed digit five teeth (Fig. 5).

All setae of the legs are simple. I, 630μ ; II, 520μ ; III, 495μ ; IV, 660μ . All legs terminate in two well-developed claws and a four-lobed pulvillus.

Male: The following description is based on a male from the Brady collection labelled 'Hartlepool, 1881.' It is the only male of this species in the Museum collections. The preparation is unsuitable for detailed study.

The dorsum ($847 \times 484\mu$) is completely covered by two smooth shields. The anterior shield ($473 \times 473\mu$) bears fourteen pairs of simple setae, and the posterior ($574 \times 484\mu$) bears about ten pairs.

The tritosternum has a narrow base and the normal pair of lacinae. The sterniti-genital shield bears the normal five pairs of simple setae. The endopodals are free.

The stigma is situated opposite the anterior edge of coxa IV, and the peritreme appears to extend to coxa I.

Ventrally the gnathosoma bears the normal four pairs of setae, of which the rostrals are the longest. The corniculi are long and slender. The chelicerae are chelate-dentate, but the dentition is not discernible.

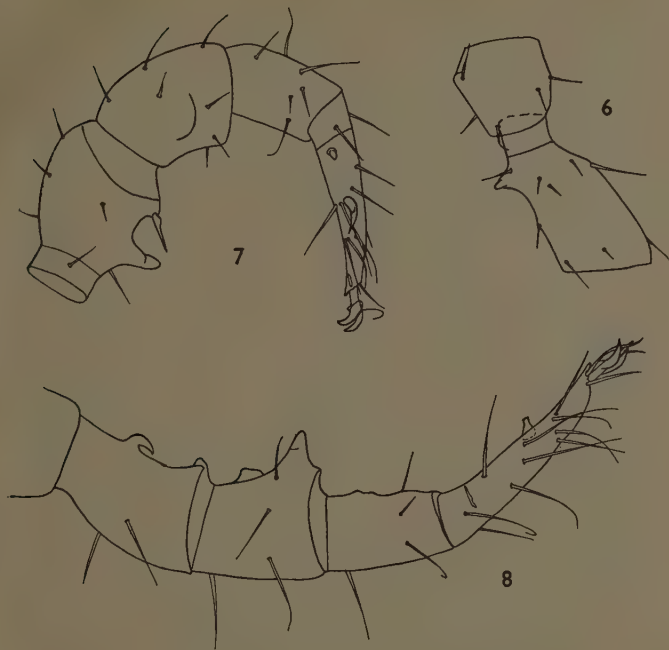
The following measurements of the legs are as accurate as the preparation permits: I, $1,265\mu$; II, 924μ ; III, 891μ ; IV, $1,045\mu$. Femur I is armed with a conical spur ventrally (Fig. 6). Leg II is shown in detail in Fig. 7. The femur is armed with a ventral spur and a lanceolate spine. The tarsus bears two lateral spurs; the basal one is short and blunt, and the median is considerably longer and pointed. Leg III is shown in detail in Fig. 8. The femur is armed with a sharp curved spur ventrally. The genu has a ventral spur apically and a blunt protuberance below the spur. The tarsus is armed with a blunt spur ventrally in its distal half. All setae are simple and all legs are provided with an ambulacral apparatus consisting of a pulvillus and two claws.

Distribution: This species is known from the Northumberland coast (Hull, 1918), Westport and Malahide, Ireland (Halbert, 1915), Sunderland and the Firth of Clyde (Brady, 1875), and recently the writer has examined material from tidal debris at Fife, Scotland and Greenborough, Kent.

Halolaelaps celticus Halbert, 1915 (Figs. 9-21)

1915, *Halolaelaps celticus* Halbert, J. N. *Proc. R. Irish Acad.* **31**, 39ii: 57, figs.

Female: The dorsum is incompletely covered by two strongly punctured shields of irregular outline (Fig. 9). The anterior shield, measuring approximately $475 \times 443\mu$, is convex posteriorly and bears 17 pairs of setae, of which two posterior pairs are stout and divided



Halolaelaps marinus (Brady), male.

Fig. 6, trochanter and femur I. Fig. 7, leg II. Fig. 8, leg III.

distally, and two anterior pairs are short and sub-spinose. The posterior shield, approximately $319 \times 396\mu$, is provided with nine pairs of setae, of which two pairs are stout and spiculate distally; the remainder are simple. The anterior edge of the shield is concave, and in some specimens also incised. Some of the setae on the interscutal membrane are pilose.

The tritosternum is normal, with the lacinae very weakly pilose (Fig 10). The narrow rectangular sternal shield has three pairs of setae. The prae-endopodal shields are weakly sclerotised and fragmented. The endopodal shields are free and fragmented. The metasternal setae lie on the interscutal membrane posterior to the sternal shield. The narrow genital shield is minutely punctured and provided with a pair of setae. Immediately posterior to the genital shield is a curved row of four platelets. The ventri-anal shield ($187 \times 385\mu$) is widely separated from the genital shield and bears nine pairs of setae, of which one is pilose. The interscutal membrane between these

shields bears four pairs of simple setae and a pair of weakly sclerotised platelets. The metapodal shields are well developed and irregular in outline.

The peritreme extends to the level of the anterior margin of coxa I. The peritrematal shield is poorly developed and not fused anteriorly with the dorsal shield. The exopodal shields are weak and fragmented.

Ventrally the gnathosoma bears the normal four pairs of setae, of which the rostrals are spatulate distally (Fig. 11). The tectum is produced into an elongate denticulate process. The chelicerae (Fig. 12) are chelate-dentate; the movable digit has three teeth and the fixed digit two.

All setae on the legs are simple. I, 583μ ; II, 506μ ; III, 517μ ; IV, 638μ . All legs bear an ambulacral apparatus comprising a pulvillus and two claws.

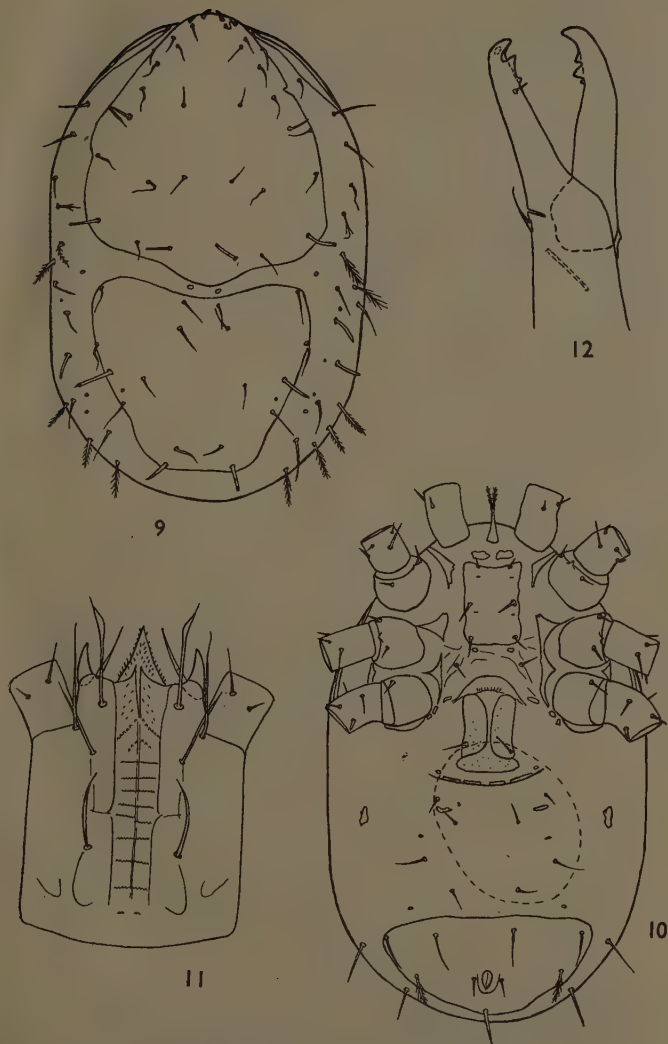
Male: The dorsum is completely covered by two finely granulate shields and measures $660 \times 407\mu$ (Fig. 13). The anterior shield (approximately $407 \times 407\mu$) bears twenty-two pairs of setae. The two anterior pairs are short and sub-spinose, while two posterior pairs are pilose and one pair spiculate distally. The remainder are simple. The posterior shield (approximately $253 \times 363\mu$) is fused with the ventri-anal shield. The majority of the posterior and lateral setae are pilose in their distal halves. Figs. 14 and 15 show in detail two of the pilose dorsal setae.

The tritosternum has a narrow base and the lacinae are finely pilose. The sterniti-genital shield (Fig. 16) bears four pairs of simple and one pair of spinose setae, the latter situated between coxae IV. The endopodals are fused with the sterniti-genital shield. The chaetotaxy of the region posterior to coxae IV is shown in Fig. 16.*

The peritreme (Fig. 17) is fused with the anterior dorsal shield and extends to the level of the anterior margin of coxa I. The exopodal shields are weak and fragmented. Ventrally the gnathosoma bears the normal four pairs of setae. The tectum (Fig. 18) is produced into an elongate denticulate process. The chelicerae (Fig. 19) are chelate-dentate. The movable digit has two teeth, the basal one being bifid at its extremity, and the fixed digit has one tooth, and the *pilus dentilis* is prominent. The spermatophoral process is free distally.

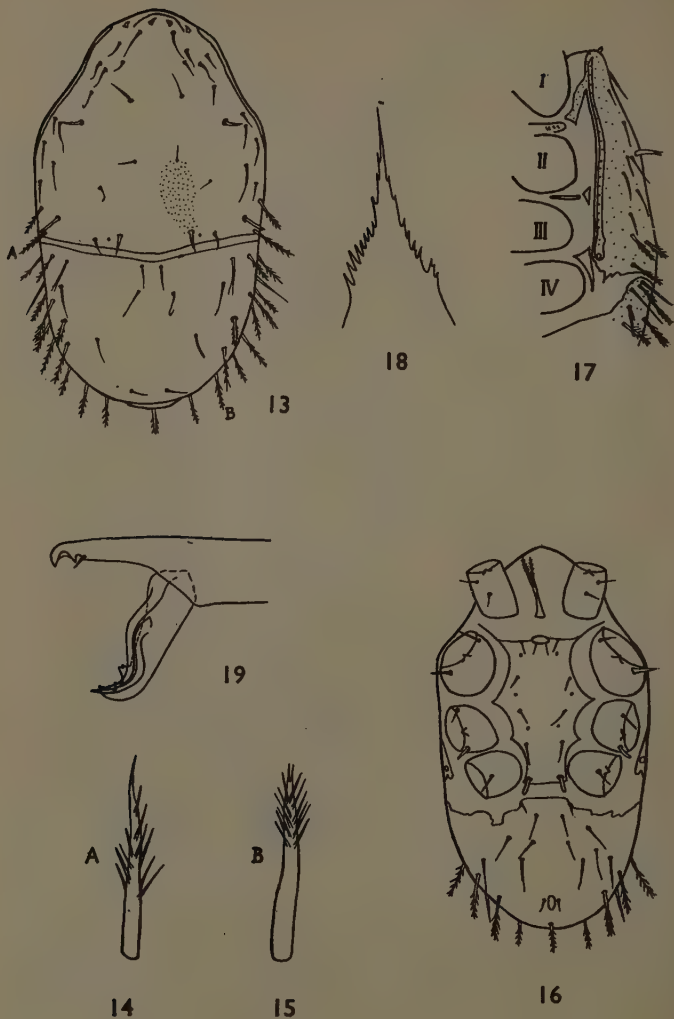
The measurements of the legs are: I, 506μ ; II, 450μ ; III, 418μ ; IV, 572μ . The armature of the legs consists of stout spines and a few setae, some of the former being forked distally. Femur I has a longitudinal line of three stout curved spines ventrally, and one simple and one serrated spine on both the dorsal and antero-lateral margins. Genu I bears a stout palmate spur directed anteriorly. Leg II is shown in detail in Fig. 20. The femur bears a blunt conical tooth and an associated spatulate seta. There are two spines ventrally on the segment and three forked spines dorsally. The tarsus terminates in

* The pilosity of the setae is exaggerated in the figures. Under low magnification these setae may appear simple.



Halolaelaps celticus Halbert, female.

Fig. 9, dorsum. Fig. 10, venter. Fig. 11, gnathosoma. Fig. 12, chelicera.



Halolaelaps celticus Halbert, male.
 Fig. 13, dorsum. Figs. 14 and 15, dorsal setae A and B. Fig. 16, venter.
 Fig. 17, lateral. Fig. 18, tectum. Fig. 19, chelicera.



Halolaelaps celticus Halbert, male.
Fig. 20, leg II. Fig. 21, femur and genu III.

a hyaline leaflike structure. Femur III bears a strong posteriorly directed spur (Fig. 21). Leg IV bears forked spines on the femur, genu and tibia. Only legs I and III bear an ambulacral apparatus.

Distribution: The type material was collected under stones below high-tide line at Westport, Ireland (Halbert, 1915). This species is widely distributed in tidal débris in the British Isles.

Halolaelaps nodosus Willmann, 1952 (Figs. 22-30)

1952, *Halolaelaps nodosus* Willmann, C. Veröfftl. Inst. Meeresforschung Bremerhaven. 1: 141, figs.

Female: The dorsum ($385 \times 186\mu$) is almost completely covered by two lightly sclerotised shields (Fig. 22). The anterior shield bears sixteen pairs and the posterior shield eleven pairs of fine, short, simple setae.

The tritosternum has a narrow base and a pair of fine lacinae. The sternal shield is twice as long as wide and carries three pairs of setae (Fig. 23). The prae-endopodal shields are absent. The endopodal shields are free and fragmented. The metasternal setae are situated, with pore 3, on small platelets posterior to the sternal shield. The weakly sclerotised genital shield bears one pair of setae. The anal

shield is almost circular and is widely removed from the genital. The interscutal membrane between the shields bears seven pairs of setae and a pair of small platelets. The specimen figured has one metapodal shield on one side and two on the other.

The peritreme (Fig. 24) extends to coxa II, and the peritrematal shield is free from the dorsal shield. The exopodal shields are fragmented.

Ventrally the gnathosoma bears the normal four pairs of setae. The tectum consists of three prongs as in Fig. 25. The chelicerae are chelate-dentate.

Legs: I, 275μ ; II, 220μ ; III, 200μ ; IV, 235μ . All setae on the legs are simple and all legs are provided with an ambulacral apparatus comprising a pulvillus and two claws.

Male: The dorsum ($330 \times 187\mu$) is completely covered by two smooth shields of approximately equal size. The anterior shield bears twenty-one and the posterior shield bears about seventeen pairs of short simple setae.

The tritosternum has a narrow base and a pair of fine lacinae. The weakly sclerotised sterniti-genital shield bears five pairs of short simple setae. The ventri-anal shield (Fig. 26) is also weakly sclerotised and bears eight pairs of setae in addition to those associated with the anus. A small posteriorly projecting tubercle lies on the ventri-anal shield midway between the posterior margin of the sterniti-genital and the anal shields.

The peritreme extends to the posterior edge of coxa II.

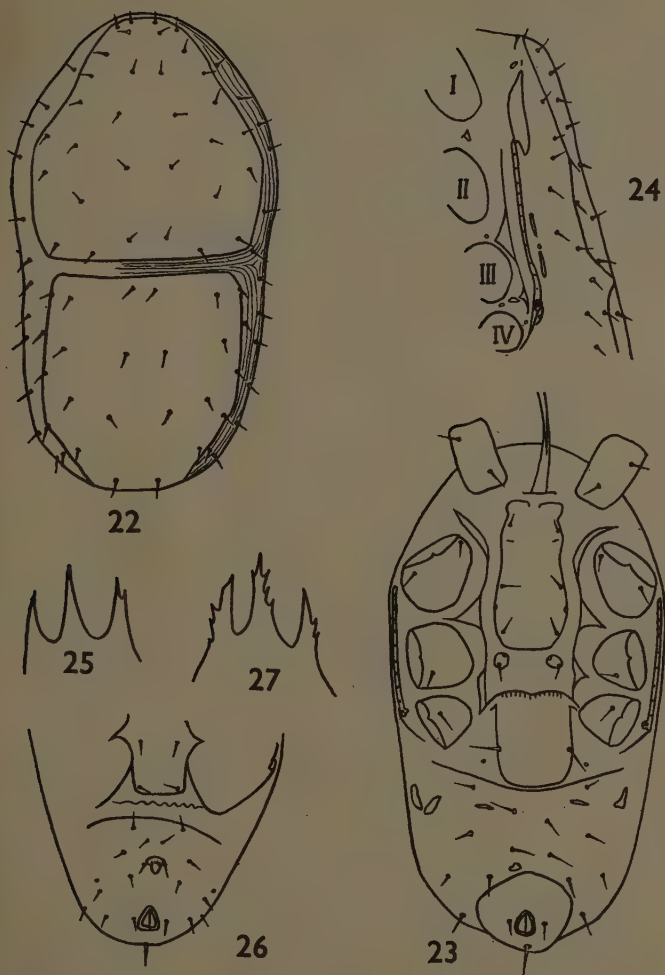
Ventrally the gnathosoma bears the normal four pairs of setae, of which the rostrals are the longest. The tectum is tridentate as in the female, but each projection is more strongly divided (Fig. 27). The male chelicerae are figured by Willmann (1952).

Legs: I, 296μ ; II, 224μ ; III, 200μ ; IV, 240μ . Leg I is provided only with simple setae. Leg II (Fig. 28) has an anteriorly directed spur ventrally on the tarsus with a small protuberance basally, and also a blunt ventral spur on the femur. The coxa has a conical tubercle. Leg III (Fig. 29) has an anteriorly directed spur on the femur. Leg IV (Fig. 30) has the genu and tibia slightly notched along one side. All legs bear an ambulacral apparatus comprising a pulvillus and two claws.

Distribution: In Britain this species has been found only in Carmarthenshire (Evans, 1954). Willmann (1952) described this species from two females and a male collected under *Salicornia* on the North Sea island of Wangerooge.

Halolaelaps incisus sp. nov. (Figs 31-42)

Female: The dorsum is completely covered by two lightly sclerotised shields (Fig. 31). The anterior shield, which is incised anterolaterally, measures $240 \times 208\mu$, and bears sixteen pairs of simple setae. The posterior shield has a median incision along its anterior margin. It measures $192 \times 152\mu$, and bears eight pairs of simple

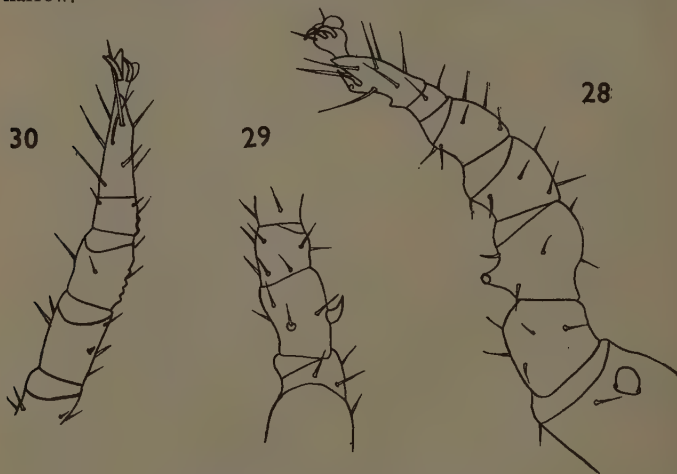


Halolaelaps nodosus Willmann.

Figs. 22-25, female. Fig. 22, dorsum. Fig. 23, venter. Fig. 24, lateral. Fig. 25, tectum. Figs. 26-27, male. Fig. 26, venter. Fig. 27, tectum.

setae. The interscutal membrane is well provided with simple setae, of which the posterior pair is the longest.

The tritosternum has a narrow base and a pair of fine lacinae. The sternal shield is twice as long as wide and has three pairs of setae (Fig. 32). The prae-endopodal shields are absent. The endopodal shields are free and fragmented. The metasternal setae are situated on small platelets on the membrane posterior to the sternal shield. The rectangular genital shield bears one pair of setae. The anal shield, which bears the normal three setae is circular. The interscutal membrane between the shields bears seven pairs of simple setae and a pair of weakly sclerotised platelets. The metapodal plates are narrow.



Halolaelaps nodosus Willmann, male.

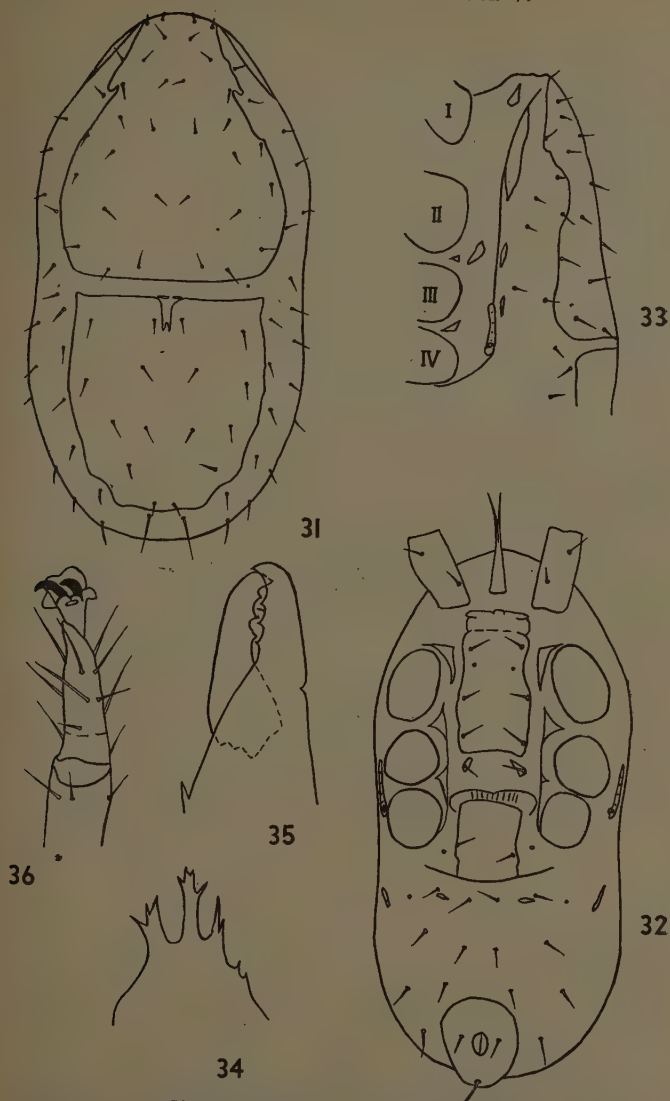
Fig. 28, leg II. Fig. 29, trochanter, femur and genu III. Fig. 30, leg IV.

The peritreme is short and extends only to the middle of coxa III (Fig. 33).

Ventrally the gnathosoma bears the normal four pairs of setae. The tectum is irregularly tridentate (Fig. 34). The digits of the chelicera are each provided with three equal-sized teeth (Fig. 35).

Legs: I, 344 μ ; II, 248 μ ; III, 240 μ ; IV, 304 μ . All setae on the legs are simple, and all legs are provided with an ambulacral apparatus comprising a pulvillus and two claws. Fig. 36 shows, in detail, tarsus II.

Male: The dorsum is almost completely covered by two lightly sclerotised shields (Fig. 37). The anterior shield (224 x 200 μ) bears twenty pairs of simple setae, and the posterior shield (176 x 165 μ)



Halolaelaps incisus sp. nov., female.
 Fig. 31, dorsum. Fig. 32, venter. Fig. 33, lateral. Fig. 34, tectum.
 Fig. 35, chelicera. Fig. 36, tarsus II.

is very faintly demarcated and bears thirteen pairs of setae. The lateral interscutal membrane is provided with a row of setae, of which the posterior pair is the longest.

The tritosternum has a narrow base and the lacinae are fine. The sterniti-genital shield bears five pairs of relatively short, simple setae (Fig. 38). The endopodals are fused with the sterniti-genital shield. The prae-endopodal shields are absent. The ventri-anal shield is weakly sclerotised and bears seven pairs of preanal seta. There are two small heavily sclerotised areas situated anteriorly on the shield. Between the sterniti-genital and ventri-anal shields lies a small elongate platelet. The metapodal shields are narrow as in the female.

The peritreme is short, extending only to the middle of coxa III.

Ventrally the gnathosoma bears the normal four pairs of setae. The tectum is tridentate, and less irregular than in the female. Both digits of the chelicera (Fig. 39) are armed with one sharp tooth.

Legs: I, 263μ ; II, 253μ ; III, 253μ ; IV, 330μ . Leg I is provided with only simple setae. Leg II (Fig. 40) is provided with a large curved, pointed, anteriorly directed spur ventrally on the tarsus and a small blunt spur basally. The femur bears ventrally a large blunt spur and a pointed spatulate seta. The trochanter and coxa each bear a small conical protuberance. Femur III (Fig. 41) bears two spurs, the basal one being curved and pointed, while the distal one is smaller and blunt. There is also a small protuberance on genu III. Genu and tibia IV (Fig. 42) are notched along one side, and the tarsus bears a blunt spur. All legs bear an ambulacral apparatus comprising a pulvillus and two claws.

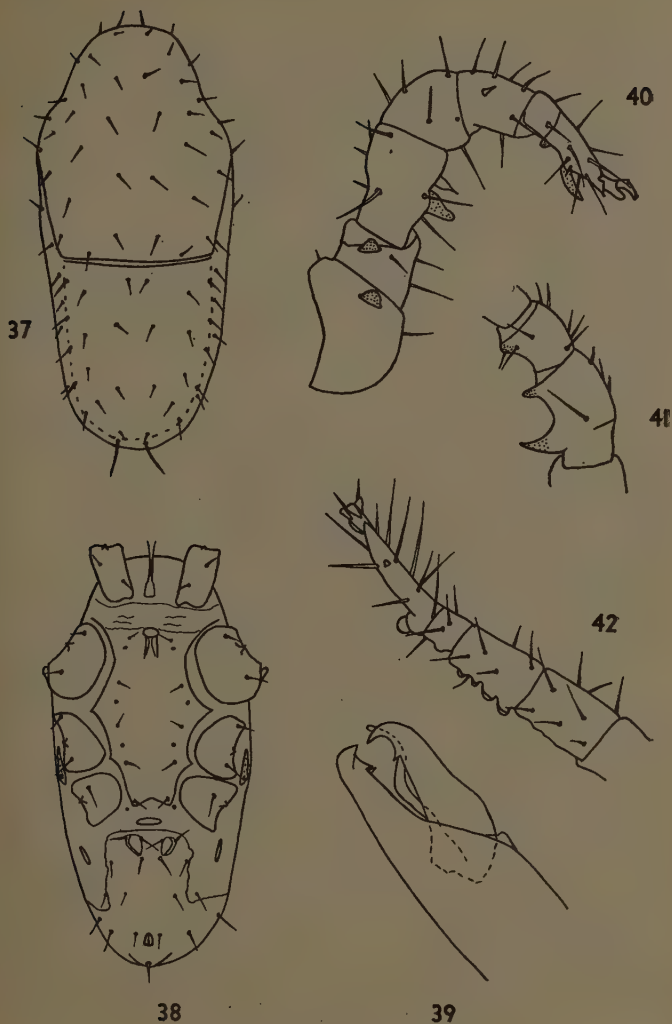
Locality: The holotype female (1955.7.8.1) and allotype male (1955.7.8.2) were collected, together with twenty paratypes of both sexes (1955.7.8.3-12), in wrack at Sea Houses, Northumberland, on 1st October, 1951, by Dr. J. T. Salmon.

This species may be separated from the other species of the genus by the structure of the peritreme in both sexes, and by the presence of paired sclerotised areas anteriorly on the ventri-anal shield in the male.

Genus *Saprolaelaps* Leitner

1946, *Saprolaelaps* Leitner, E. Zbl. Gesamt. Geb. Ent. Lienz. 1:142.

Dorsal shield divided in both sexes; dorsal setae simple. In the female, sternal shield longer than broad, not fused with endopodals; genital shield wedge-shaped bearing a pair of setae; anal shield widely removed from genital. In the male, a holoventral shield; sterniti-genital region of shield fused with endopodals. Stigma situated in line with coxa IV; peritreme extending beyond coxa I; peritrematal shield well developed, free. Tectum usually with an elongate denticulate process; chelicerae chelate-dentate, spermatophoral process free distally. Coxae II in both sexes, with an acute spur on the anterior margin;



Halolaelaps incisus sp. nov., male.

Fig. 37, dorsum. Fig. 38, venter. Fig. 39, chelicera. Fig. 40, leg II.
Fig. 41, femur and genu III. Fig. 42, leg IV.

femur II spurred in the male. Specialized seta on palptarsus with three prongs. Type species: *Saprolaelaps subtilis* Leitner, 1946.

Key to the females of the British species of *Saprolaelaps* Leitner.

1. Sternal and peritrematal shields strongly punctured; movable digit of chelicera with three teeth....*Saprolaelaps punctulatus* Leitner.
- Sternal and peritrematal shields smooth; movable digit of chelicera with two teeth.....*Saprolaelaps bacchusi* sp. nov.

Saprolaelaps punctulatus Leitner

1946, *Saprolaelaps punctulatus* Leitner, E. Zbl. Gesamt. Geb. Ent. Lienz. 1: 81, 147, ♀, figs.

Female: The dorsum, which measures $600-638\mu$ in length x $351-396\mu$ in breadth, is completely covered by two strongly punctate shields. Both shields bear about fourteen pairs of setae. The interscutal membrane is provided with a number of setae, some of which are very finely spiculate distally. The posterior shield is incised anteriorly.

The tritosternum has a narrow base and a pair of long thin lacinae. The minutely punctured sternal shield is longer than wide and bears three pairs of setae, of which the second pair is stout. The shield is not fused with the fragmented endopodal shields. The prae-endopodal shields are absent. The metasternal setae lie, with pore 3, on small platelets posterior to the sternal shield. The punctured genital shield is longer than wide and bears one pair of setae. The circular anal shield is also finely punctured and bears the normal three anal setae. The interscutal membrane is sclerotised and strongly punctured on either side of the anal shield and bears a number of simple setae. The metapodal shields are elongate and well developed.

The peritreme extends to coxa I. The peritrematal shield, which extends posterior to the stigma and reaches the posterior edge of coxa IV, is not fused with the dorsal shield. The peritrematal shield is strongly punctured.

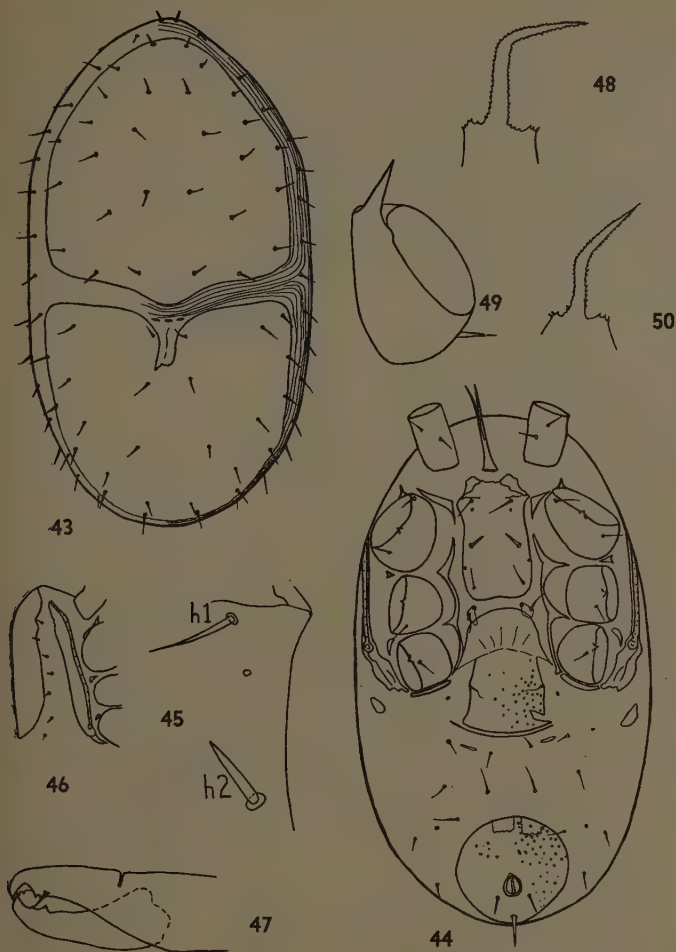
Ventrally the gnathosoma bears the normal four pairs of simple setae. The tectum is produced into an elongate denticulate process. The fixed digit of the chelicera has four teeth and the movable digit three.

Legs: I, 407μ ; II, 429μ ; III, 374μ ; IV, 506μ . All legs are provided only with simple setae. Coxa II has an anteriorly projecting spur. All legs are provided with an ambulacral apparatus comprising a pulvillus and two claws.

Locality: A single female from compost at Hounslow, Middlesex, collected by Mr. E. Browning on 22nd January, 1954. This is the first record of the species in Britain. It was previously known only from Austria (Leitner, 1946).

Saprolaelaps bacchusi sp. nov. (Figs. 43-55)

Female: The dorsum, which measures $533-539\mu$ in length x $308-338\mu$ in breadth, is incompletely covered by two finely punctured shields (Fig. 43). The anterior shield ($286-275\mu$) bears fourteen



Saprolaelaps bacchusi sp. nov.

Figs. 43-49, female. Fig. 43, dorsum. Fig. 44, venter. Fig. 45, sternal setae h1 and h2. Fig. 46, lateral. Fig. 47, chelicera. Fig. 48, tectum. Fig. 49, coxa II. Fig. 50, tectum of male.

pairs of simple setae. The posterior shield ($231 \times 286\mu$), which is incised * anteriorly, bears thirteen pairs of setae distributed as in the figure. There are a number of setae on the striated lateral interscutal membrane.

The tritosternum has a narrow base and a pair of lacinae. The rectangular sternal shield (Fig. 44) bears three pairs of setae, of which the second pair, h2, is stout (Fig. 45). The shield is not fused with the fragmented endopodal shields. The prae-endopodal shields are absent. The metasternal setae lie, with pore 3, on small platelets posterior to the sternal shield. The finely punctured genital shield bears one pair of setae. The circular anal shield is finely punctured and bears the normal three anal setae. Immediately posterior to the genital shield lies a pair of small elongate platelets, while the interscutal membrane bears seven pairs of simple setae. The metapodal shields are weakly developed.

The peritreme (Fig. 46) extends to the middle of coxa I and the peritrematal shield, which extends to the posterior margin of coxa IV, is not fused with the dorsal shield. The exopodal shields are small and fragmented.

Ventrally the gnathosoma bears the normal four pairs of simple setae. The movable digit of the chelicera (Fig. 47) bears two teeth and the fixed digit four. The tectum (Fig. 48) is slender and denticulate and has prominent 'shoulders'.

Legs: I, 300μ ; II, 297μ ; III, 286μ ; IV, 374μ . Coxa II (Fig. 49) bears an anteriorly projecting spur, and femur IV bears a thick short spine dorsally. All legs are provided with simple setae and terminate in an ambulacral apparatus comprising a pulvillus and two claws.

Male: The dorsum (Fig. 51) measures $429 \times 264\mu$, and is completely covered by two faintly reticulated shields. The anterior shield bears twenty-one pairs of simple setae and the posterior bears twelve pairs.

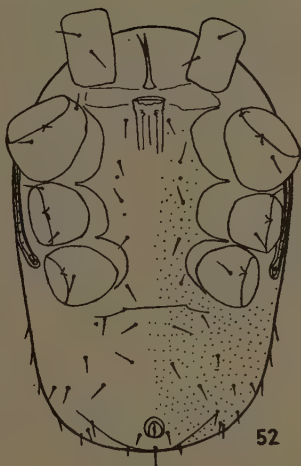
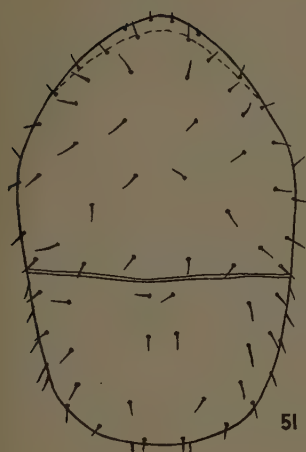
The tritosternum has a narrow base and a pair of lacinae. There appears to be no distinct division between the sterniti-genital and ventri-anal shields, which are finely punctate (Fig. 52). The sterniti-genital shield bears five pairs of simple setae. The endopodals are fused with the sterniti-genital shield. The prae-endopodal shields are absent. The chaetotaxy of the region posterior to coxae IV is shown in Fig. 52.

The peritreme extends to coxa I and the peritrematal shield, which does not extend past the stigma, is not fused with the dorsal shield.

Ventrally the gnathosoma bears the normal four pairs of setae. The tectum (Fig. 50) is produced into an elongate denticulate process, as in the female. The chelicera (Fig. 53) bears a single tooth on each digit.

Legs: I, 374μ ; II, 363μ ; III, 286μ ; IV, 407μ . Leg II is shown in detail in Fig. 54. The femur is armed with a large finger-like spur

* The size and shape of this incision varies considerably within the species.



Saprolaelaps bacchusi sp. nov., male.
 Fig. 51, dorsum. Fig. 52, venter. Fig. 53, chelicera. Fig. 54, leg II.
 Fig. 55, ambulacral apparatus of leg III.

and a small rounded spur ventrally. The other legs are provided only with simple setae. Fig. 55 shows in detail the ambulacral apparatus of leg III.

Locality: The holotype female (1954.3.15.158) and allotype male (1954.3.15.159) were collected together with three females and a male (paratypes, 1954.3.15.160-163) by Mr. M. E. Bacchus from leaf-mould at Ruislip, Middlesex on 1st February, 1951.

This species appears to be closely related to *Saprolaelaps areolatus* Leitner, 1946, but differs, at least from the description and figures of *areolatus*, in the presence of fourteen pairs of setae on the anterior dorsal shield, four teeth on the fixed digit of the chelicerae in the female and the dense punctations on the genital shield.

SUMMARY

1. The genera *Halolaelaps* Berlese and Trouessart and *Saprolaelaps* Leitner (Family NEOPARASITIDAE) are redefined.
2. Keys are given to both sexes of the British species of these genera.
3. *Halolaelaps incisus* and *Saprolaelaps bacchusi* are described as new species.
4. *Saprolaelaps* is recorded for the first time from the British Isles.

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ACHERONTIA ATROPOS (L.) IN SOMERSET (LEP: SPHINGIDAE).

On 22nd August, 1955, I found a larva of *Sphinx ligustri* L., roaming about ready to pupate, which was of a most unusual pink colouration. On 12th October an *A. atropos* freshly emerged and slightly crippled was taken at Wells, Somerset, and handed to me.

Old Ford House,
Frome, Somerset.

G. H. W. CRUTTWELL.

NOTES ON COLLECTING THE LARVAE OF *HYDRAECIA HUCHERARDI* MABILLE

By A. L. GOODSON

Further to my notes in the *Entomologist's Gazette* 6:65, in which the almost certain conclusion was reached that the foodplant of this species was the Marsh Mallow (*Althaea officinalis*), we have now established the fact beyond all doubt by finding the larvae in some numbers feeding on the root of the plant, their identity being proved by the emergence, to date, of eleven specimens of both sexes. An account of the trip may be of interest.

On 14th July, I, together with Mr. George Rance of the Zoological Museum, Tring, as an assistant, set off for Romney Marsh, complete with spades, sheets, knives and everything necessary for dealing with a larva which we anticipated would be feeding on the root. The weather was ideal, but most of the first day was wasted in trying to find accommodation, a lesson to remember in planning future trips at this time of the year, and it was not until 6 p.m. that we were fixed up and free to go down to the marsh. The evening was spent in finding the driest spots for digging, an important point since roots growing in wet heavy earth are almost impossible to break up without injuring the larvae, a point we learned last year when digging for pupae. Next morning we were on the site selected by 9 a.m., full of hope since the whole crop of foodplant showed a distinct droop and sickly look, suggesting dozens of larvae eating away at their roots. Alas, on asking the owner of the field for permission to dig, he sadly disillusioned us by casually remarking that the stuff had been *sprayed* several times to kill it, at which our spirits drooped almost as much as the plant. Had this affected the larvae? should we leave the spot which was the driest, or waste precious time in perhaps digging nothing or dead larvae? We decided to try it and set to work on the largest and most luscious plants, carefully taking the roots apart, but after an hour or so had precisely nothing to show for our pains. It was then that we dug up a rather poor, stunted looking plant which seemed to have escaped spraying, broke the root, and there at last was our first larva, a half-grown example, but to our eyes a thing of beauty and a joy for ever. The spraying, or lack of it, was nothing to do with finding the larva as future success showed, sprayed plants giving as many larvae as unsprayed, but it did seem to us to be a fact that the stunted plants were much more likely to be infected than others, though occasionally we got larvae from large well grown ones.

The larvae are easily found as, when breaking the root, it snaps at its weakest point, i.e., the chamber eaten out by the larva. This is almost always in the crown and just above one of the many tap roots; only on three occasions did we find taps themselves touched,

in each case the entire length had been eaten out completely by a full-grown larva.

The largest number found in any one root was five, which was exceptional, the average being two, but many roots were not infected at all. Sometimes we would dig for an hour without finding a single larva, and then perhaps six or seven in as many minutes. One could almost tell on sight if the root was infected or not, the taps being very bright in colour and tough if no larvae were at work. No knives were needed for slicing, breaking was far safer, and only once or twice was a larva injured.

After our first, half grown, example, most of the rest were large full fed ones, some already in the shrunken pre-pupal state which pupated all right if placed on the hard shiny bottom of a collecting tin. All other larvae were placed in large tins with a plentiful supply of earth and roots, fresh ones being placed on the surface every other day, and this was continued after our return.

During the digging an occasional pupa was found, and owing to the dry nature of the earth this hot summer, they were not injured but fell out when breaking the root; about ten were obtained in this way during our week's stay.

On the fourth day we were joined by Mr. George Haggett and his mother, who, despite the broiling sun, got all they needed. I will leave it to Mr. Haggett to describe this new larva in detail since his previous descriptions of such have been of the highest standard and leave nothing to be desired. I will merely mention here that when half-grown it has a beautiful pink pattern on a semi-transparent ground, but this pattern tends to disappear as it grows and when full fed it is somewhat colourless and transparent, though still retaining a slight pinkish tinge.

There only remains to tell of what was found when the tins were turned out on 20th August, which was somewhat disappointing. Almost half the pupae were in the process of being eaten by a tiny maggot-like creature which may or may not be a parasite; its identity is not yet established. A further note on this will be published at a future date. The rest of the pupae were in good order and the first hatched on 24th August.

In conclusion I would say that the foodplant, as a result of the digging, will not suffer in any way since the roots shoot out again in a very short time, some in my garden already are doing so despite the dry weather. The chief enemy of the plant is the farmer, whose cattle dislike it intensely, but there is so much on uncultivated ground that there is no danger of it disappearing. The distribution of the species in relation to that of the plant still remains to be worked out by collectors living within reach of likely marshes.

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BRITISH TRICHOPTERA (CADDIS FLIES)

A MODIFIED FAMILY-KEY, AND A KEY TO THE GENERA OF THE FAMILY LIMNEPHILIDAE, WITH A CHECK LIST OF THE SPECIES OF THE LIMNEPHILIDAE

K

By D. E. KIMMINS

(Dept. of Entomology, British Museum, Nat. Hist.)

British collectors have asked from time to time whether alternative keys could be prepared to replace some of those in Mosely's handbook of the British Caddis Flies, to identify the females as well as the males. The keys which appear to have given most trouble, particularly to less-advanced students, are those to the families and to the genera of the family Limnephilidae. The family-key offered here is a modified version of that given by Ulmer for the world fauna in the Trichoptera volume of the Genera Insectorum, condensed to deal only with the families occurring in Britain. This did not present much difficulty, but the key to the Limnephilid genera was quite a different matter.

The Limnephilid key given by Mosely functions quite well when dealing with males, but with the females one finds that the tibial spur-formula, 1.3.4, occurs not only throughout one of the main subdivisions, but also in one genus in the other sub-division. An attempt has therefore been made to produce a key which will work with either sex; it has proved an extremely difficult task, and it is not claimed that the resulting will work with absolute certainty in every case.

In the course of this work it became evident, from a study of the female genitalia, that the genus *Stenophylax* was far from homogeneous. A grouping of the British species according to the type of the female genitalia showed that they could be placed in four main groups, corresponding to four of the numerous groups defined by McLachlan in his Revisional Monograph of the European Fauna. McLachlan suggested at the time that most of his groups would probably later be made into genera, and he subsequently proposed names for some of them. Wallengren gave generic names to other groups, but these did not come into general use. Since it now seems desirable to split still further the old genus *Stenophylax* on the basis of McLachlan's groups, Wallengren's names are available for the three groups in our fauna which are not congeneric with the true *Stenophylax* (type species *Stenophylax permistus* McLachlan).

At this stage in the work the writer learned from Dr. F. Schmid of Lausanne that the latter had in hand a revision of the world genera of the Limnephilidae and, to avoid any possible overlapping, work on the British key was suspended until the appearance of Dr. Schmid's work in 1955. A study of this revealed that we had independently reached the same conclusions concerning the need to subdivide the genus *Stenophylax*, and Dr. Schmid has in fact revived

Wallengren's generic names *Rhadicoleptus*, *Hydatophylax* and *Potamophylax* for McLachlan's groups 4, 9 and 10 respectively. Dr. Schmid has also proposed new generic names *Melampophylax* and *Allogamus*, in which he places our species *Halesus mucoreus* Hagen (= *H. guttatipennis* McLachlan) and *Halesus auricollis* (Pictet) respectively. On the other side of the balance sheet, he has replaced *Colpotaulius incisus* (Curtis) and *Asynarchus coenosus* (Curtis) in the genus *Limnephilus*, the genus *Phacopteryx* becomes a synonym of *Anabolia* and the genus *Apatidea* a synonym of *Apatania*. The genera *Colpotaulius*, *Asynarchus*, *Phacopteryx* and *Apatidea* thus disappear from the British list. I am adopting these changes proposed by Dr. Schmid, and in addition I am including in the restricted genus *Stenophylax* Kolenati the genus *Micropterna* McLachlan (**Syn. nov.**). The latter genus is distinguished from *Stenophylax* primarily on a single unisexual character, the relatively short basal segment of the anterior tarsus, and as the proportions of this and the succeeding segment are by no means constant, and as I can find no other satisfactory character to separate these two very similar-looking genera, it seems more logical to consider them as one genus.

When dealing with venation, considerable reference has been made by McLachlan and subsequent workers to the 'apical forks' and 'apical cells'. These terms are well understood by Trichopterists, but it is considered that a change to a terminology more in conformity with the Comstock and Needham system will make the study of Trichoptera simpler for general students. McLachlan's 'apical forks' and 'apical cells' are therefore referred to in these keys by the name of the vein forming their anterior border, as in the following table:

McLachlan, Mosely, etc.	Present work.
Apical fork No. 1 =	Apical cell No. 1 = Cell R2
	Apical cell No. 2 = Cell R3
Apical fork No. 2 =	Apical cell No. 3 = Cell R4
	Apical cell No. 4 = Cell R5
Apical fork No. 3 =	Apical cell No. 5 = Cell M1
	Apical cell No. 6 = Cell M2
Apical fork No. 4 =	Apical cell No. 7 = Cell M3
	Apical cell No. 8 = Cell M4
Apical fork No. 5 =	Apical cell No. 9 = Cell Cu1a
	Apical cell No. 10 = Cell Cu1b

In cases where two or more veins are coalesced, as always with M3 and M4 in the hind wing of Trichoptera, the cell posterior to them takes the name of the combined veins (M3+4). If one of the marginal cells extends basally to the line of cross-veins forming the anastomosis, it is said to be *sessile*; if, on the other hand, it does not reach the anastomosis, it is said to be *stalked* or with a *footstalk*. The relative lengths of cells and their footstalks are sometimes of value as taxonomic characters.

My interpretation of the cubital and anal veins in both wings differs

from that given by Mosely in his handbook, as set out below:—

Mosely.	Present work.
Upper branch of cubitus	Cu1a
Lower branch of cubitus	Cu1b
1st anal vein	Cu2
2nd anal vein	1A
3rd anal vein	2A
Un-named anal veins	3A and 4A

The following abbreviations are used in the keys, in addition to the usual venational abbreviations:—

FW = fore wing; HW = hind wing; DC = discoidal cell; seg. = segment; ant. = anterior; post. = posterior; max. = maxillary.

KEY TO FAMILIES OF BRITISH TRICHOPTERA

(Figure references in this key are to illustrations in Mosely, Brit. Caddis Flies, 1939)

- 1 Insects minute, very strongly pubescent, wings with numerous erect hairs, fringes very long, those of HW longer than greatest width of HW; antennae short and stout; max. palpi ♂ ♀ 5-segmented, last seg. simple
HYDROPTILIDAE
- Insects rarely minute, generally medium-sized or large; wings without thick, erect hairs, or at most they are scattered; fringes not as long as breadth of wing; antennae as long as or longer than FW, only occasionally shorter
- 2 Max. palpi 5-segmented
- Max. palpi with fewer than 5 segs.
- 3 Terminal seg. of max. palpi multi-articulated, flexible, generally much longer than all other segs. together (Fig. 8h)
- Terminal seg. of max. palpi not articulated, generally not flexible, only a little or not longer than the remaining segs. together
- 4 Ocelli present PHILOPOTAMIDAE
- Ocelli absent
- 5 Ant. tibia with 3 spurs
- Ant. tibia with fewer than 3 spurs
- 6 R1 in FW forked at its apex (Fig. 454)
- PSYCHOMYIIDAE
(genus *Ecnomus*)
- R1 in FW simple (Fig. 430) POLYCENTROPODIDAE
- 7 Cell R2 in FW present (Fig. 3) HYDROPSYCHIDAE
- Cell R2 absent in both wings (Fig. 458)
- PSYCHOMYIIDAE Kolenati
(except genus *Ecnomus*)

- 8 Ocelli present 9
 Ocelli absent 11
 9 Ant. tibia with 2 or 3 spurs, middle tibia with 4 spurs 10
 Ant. tibia without or with only one spur, middle tibia
 with 2 or 3 spurs LIMNEPHILIDAE ♀
 10 Segs. 1 and 2 of max. palpi short and thick, 3 longer
 and thinner (Fig. 8i) RHYACOPHILIDAE
 Seg. 2 of max. palpi longer than seg. 1 PHRYGANEIDAE ♀
 11 DC in FW present, closed (Fig. 285) 13
 DC in both wings absent (Fig. 271) 12
 12 Spurs 2.4.4. MOLANNIDAE
 Spurs 2.2.4 BERAEEIDAE
 13 At least in FW, R5 is fused with M1+2 (Fig. 285)* 14
 In both wings, R5 is not fused with M1+2 (Fig. 231) 15
 14 M fused with Rs from its base to anastomosis (Fig. 281)
 ODONTOCERIDAE ♂
 M free at its base (Fig. 285), or fused with Cu 1
 (Fig. 338) (*Triaenodes*) LEPTOCERIDAE
 15 A cross-vein between R1 and R2 at least in FW (Fig. 283) 16
 No cross-vein between R1 and R2 in FW (Fig. 231)
 SERICOSTOMATIDAE ♀
 16 Spurs 2.2.4 SERICOSTOMATIDAE ♀
 Spurs 2.4.4. ODONTOCERIDAE ♀
 17 Max. palpi with 4 segs. PHRYGANEIDAE ♂
 Max. palpi with less than 4 segs. 18
 18 Max. palpi filiform, segs. cylindrical, with neither thick
 nor upstanding hairs nor scales, never lying close to
 face; ocelli present; ant. tibia at most with only 1 spur
 LIMNEPHILIDAE ♂
 Max. palpi thick, often with upstanding hairs or scales,
 often forming a mask covering the face. Ant. tibia with
 2 spurs; ocelli absent (in British species)
 SERICOSTOMATIDAE ♂

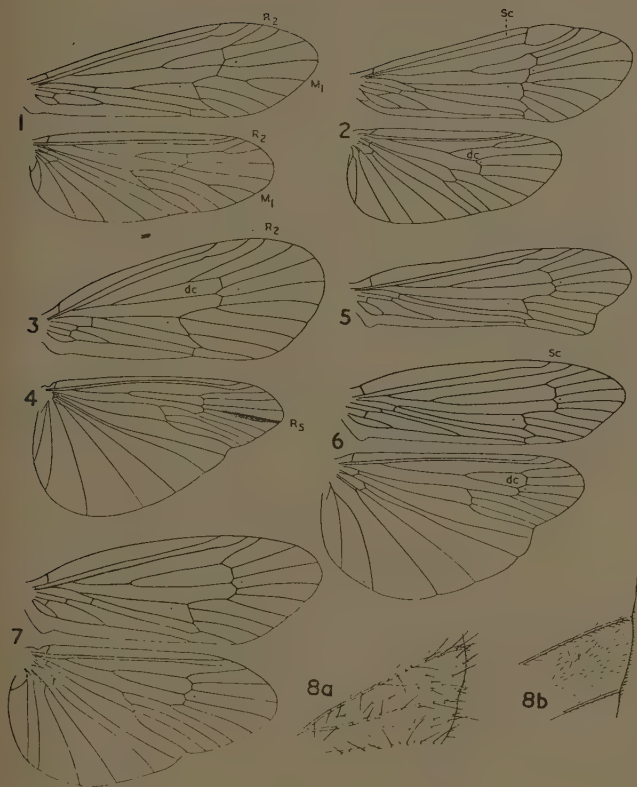
KEY TO THE BRITISH GENERA OF THE LIMNEPHILIDAE

- 1 Wings vestigial ENOICYLA ♀
 Wings normally developed 2
 2 Cells R2 and M1 in both wings with footstalks (Fig. 1)
 ENOICYLA ♂
 Cells R2 and (generally) M1 in both wings sessile 3
 3 DC in HW open. Sc of FW ending in a transverse cross-
 vein between C and R1 (Fig. 2) APATANIA
 DC in HW closed. Sc in FW running into costal margin
 (Fig. 6) 4

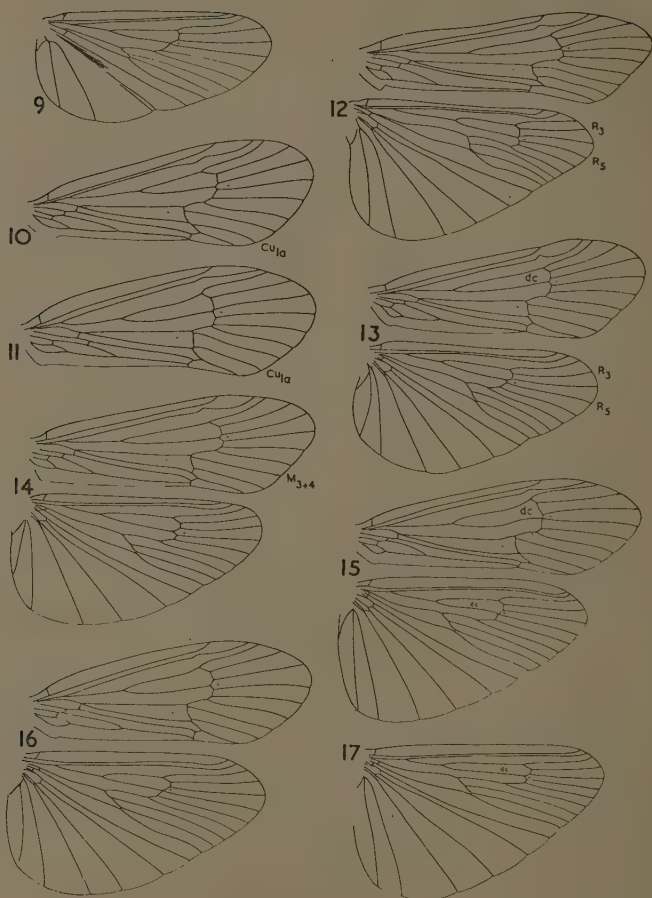
* In *Odontocerum* ♂ FW, M fuses with Rs near its base, M1+2 remain-
 ing fused with R5, M3+4 separating at anastomosis; in HW R5 is not fused
 with M1+2.

- 4 Cell R2 in FW overlapping apical third of DC (Fig. 3)
IRONOQUIA
- 5 Cell R2 in FW only slightly overlapping DC
R5 in HW blackened and bordered with black (Fig. 4)
GRAMMOTAULIUS
- 6 R5 in HW not blackened
Apical border of FW more or less sharply emarginate (Fig. 5)
GLYPHOTAEIUS
- 7 Apical border of FW truncate or rounded
Post. margin of HW with a definite, obtuse excision near cell Cula (Fig. 6)
- 8 Post. margin of HW weakly and uniformly rounded or at most only slightly excised
FW rather narrow, pointed, with some rather strong hairs on veins (Fig. 6) LIMNEPHILUS *incisus* Curtis
- 9 FW broader, rounded apically, with some rather strong hairs on membrane as well as on veins (Fig. 7)
ANABOLIA *brevipennis* Curtis
- 9 Membrane and veins of FW with strong, erect hairs, arising from wart-like bases (Fig. 8a)
CHAETOPTERYX
- Membrane of FW with weaker hairs, not arising from definite wart-like bases (Fig. 8b)
- 10 Hind tibia with 3 spurs
Hind tibia with 4 spurs
- 11 Mid tibia with 2 spurs. ♂ with a fold or pouch in the membrane of the anal area of HW, containing a pencil of long hairs (Fig. 9)
ECCLISOPTERYX
- Mid tibia with 3 spurs. ♂ with or without such a pencil of hairs
- 12 Cell Cula in FW with a short footstalk (cell not reaching thyridial cell). ♂ with a pencil of long hairs in HW (Fig. 10)
DRUSUS
- Cell Cula in FW sessile on thyridial cell. ♂ without a pencil of hairs in HW (Fig. 11)
- 13 Larger insects, FW 17-24 mm., generally striated
HALESUS
- Smaller insects, FW 11-14 mm., unicolorous, with pale thyridial spot, or finely irrorated
- 14 In HW, M forks at or slightly beyond base of DC
ALLOGAMUS
- In HW, M forks clearly beyond base of DC
MELAMPOPHYLAX
- 15 FW relatively long and narrow, apex generally obliquely truncate; cell R5 in HW generally closed by a straight (not oblique) cross-vein, which is shorter than that closing cell R3 (Fig. 12)
LIMNEPHILUS

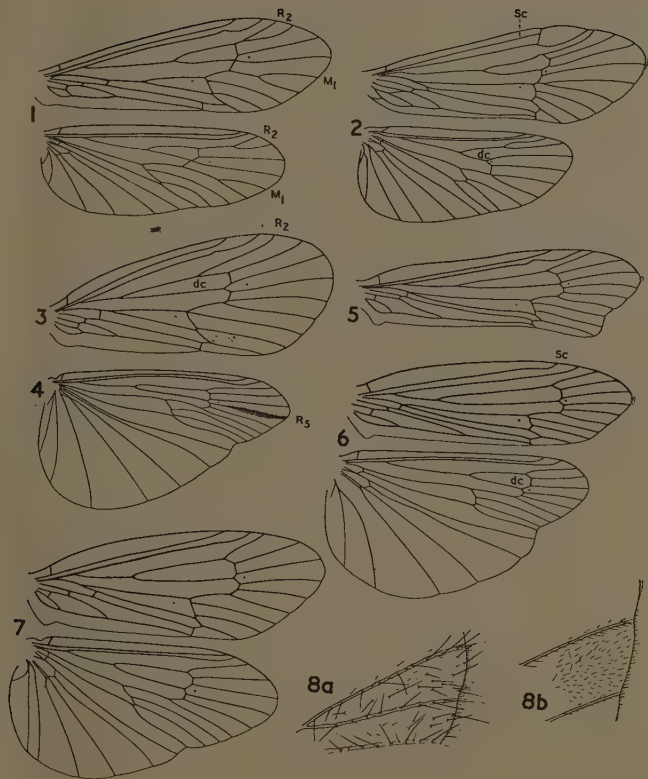
- FW relatively broader, apical margin rounded, basal cross-vein of cell R5 in HW oblique or curved, not or only slightly shorter than that closing cell R3 (Fig. 13) 16
- 16 DC in FW with ant. margin more or less straight in apical half; fork of M in HW generally clearly beyond base of DC (Fig. 13) † 17
- DC in FW with ant. margin more or less concave in apical half; fork of M in HW generally at or only slightly beyond base of DC (Fig. 15) ‡ 20
- 17 FW brownish, practically without pale markings 18
- FW greyish brown or greyish, with conspicuous greyish hyaline markings RHADICOLEPTUS
- 18 FW with a small, pale spot on hind margin at apex of M3+4 (Fig. 14) LIMNEPHILUS *coenosus* Curtis
- FW without such spot 19
- 19 ♂ cerci large, claspers short; ♀ vulvar scale clearly trilobed ANABOLIA *nervosa* Curtis
- ♂ cerci small, claspers long; ♀ vulvar scale broad, not lobed HYDATOPHYLAX
- 20 FW with pale striations in marginal cells POTAMOPHYLAX
- FW with pale speckles 21
- 21 DC in HW narrow (Fig. 17) MESOPHYLAX
- DC in HW broader (Fig. 15) STENOPHYLAX
- † In *Hydatophylax*, the ant. margin of DC is faintly concave, but the fork of M is clearly beyond base of DC.
- ‡ In *Potamophylax rotundipennis*, ant. margin of DC in FW is only faintly concave, but fork of M in HW is only slightly beyond base of DC.



Figs. 1-8. Wings of Limnephilidae. 1, *Enoicyla pusilla* (Burmeister) ♂; 2, *Apatania wallengreni* McLachlan, ♂; 3, fore wing of *Ironoquia dubia* (Stephens) ♂; 4, hind wing of *Grammotaulius nitidus* (Müller) ♂; 5, fore wing of *Glyptotaelius pellucidus* (Retzius) ♂; 6, *Limnephilus incisus* Curtis ♂; 7, *Anabolia brevipennis* (Curtis) ♂; 8a, trichiation of membrane of *Chaetopteryx villosa* (Fabricius); 8b, trichiation of *Halesus radiatus* (Curtis).



Figs. 9-17. Wings of Limnephilidae. 9, hind wing of *Ecclisopteryx guttulata* (Pictet) ♂; 10, fore wing of *Drusus annulatus* Stephens ♂; 11, fore wing of *Halesus radiatus* (Curtis) ♂; 12, *Limnephilus rhombicus* (Linnaeus) ♂; 13, *Rhadicoleptus alpestris* (Kolenati) ♀; 14, *Limnephilus coenosus* Curtis ♂; 15, *Stenophylax permistus* McLachlan ♀; 16, *Potamophylax stellatus* (Curtis) ♀; 17, hind wing of *Mesophylax aspersus* (Rambur) ♀.



Figs. 9-17. Wings of Limnephilidae. 9, hind wing of *Ecclisopteryx guttulata* (Pictet) ♂; 10, fore wing of *Drusus annulatus* Stephens ♂; 11, fore wing of *Halesus radiatus* (Curtis) ♂; 12, *Limnephilus rhombicus* (Linnaeus) ♂; 13, *Rhadicoleptus alpestris* (Kolenati) ♀; 14, *Limnephilus coenosus* Curtis ♂; 15, *Stenophylax permistus* McLachlan ♀; 16, *Potamophylax stellatus* (Curtis) ♀; 17, hind wing of *Mesophylax aspersus* (Rambur) ♀.

HALESUS

- 43 *radiatus* (Curtis)
 44 *digitatus* (Schränk)

MELAMPOPHYLAX

- 45 *mucoreus* (Hagen) = *Halesus guttatipennis* McLachlan
 ENOICYLA

- 46 *pusilla* (Burmeister)

STENOPHYLAX

- 47 *permistus* McLachlan
 48 *vibex* (Curtis)
 49 *lateralis* (Stephens) = *Micropterna lateralis* (Stephens)
 50 *sequax* (McLachlan) = *Micropterna sequax* McLachlan

MESOPHYLAX

- 51 *impunctatus impunctatus* McLachlan
 51a *i. zelandicus* McLachlan
 52 *aspersus* (Rambur)

ALLOGAMUS

- 53 *auricollis* (Pictet) = *Halesus auricollis* (Pictet)

HYDATOPHYLAX

- 54 *infumatus* (McLachlan) = *Stenophylax infumatus* McLachlan

CHAETOPTERYX

- 55 *villosa* (Fabricius)

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COLIAS CROCEUS (FOURC.) IN KENT (LEP: PIERIDAE)

Two specimens were observed in a garden at New Romney on 14th August, 1955. Two were caught and released at Dungeness, 16th, one at Ham Street, 22nd, and two at Lydden, 25th August. The weather was hot and sunny, with a slight onshore breeze. No definite direction of flight was observed.

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DEUS EX MACHINA

By I. R. P. HESLOP

Iris, in classical mythology the winged messenger of the Gods, is apparently particularly sensitive to modern modes of transport.

In a wood somewhere in the Strong Country in 1954, in which the Purple Emperor was especially common that year, my wife and I watched three male specimens continuously beating up and down their 'parading ground', in this case a motor road, meeting and fluttering round each other sometimes, and more frequently settling on or in the crowns of the oaks.

When a large motor vehicle, for example a bus, passed by, it was noticeable that they invariably settled on the oak foliage. We thought at first that this was due to the sudden gust of wind caused by the passage of the vehicle: until we observed that the settling frequently took place before this could be felt.

Then a motor concrete mixer started up on a neighbouring building site and almost immediately the Emperors settled: not to fly again until a minute or two after the machine had ceased operating, which was some time later. On this occasion, as the noise continued the insects crept deeper into the crowns of the trees. Later, the occasional passing of a jet aircraft always caused settling, though for a few seconds only.

The predilection of *Apatura iris* Linn. for motor cars, stationary ones, has however often been noted. This has usually been attributed to some subtle attraction, perhaps by a fractional distillation, of the odours of petrol. But I am not so sure: especially since I have had no positive results from repeated experiments with petrol poured on piles of sawdust, and so on. But in the previous year, 1953, I had an experience which may indicate some solution. After a fruitless search in the woods I returned to my car, at 3.30 p.m. B.S.T., to find a Purple Emperor actually settled on the bonnet. It was a large and very fresh male, with the general colour deeper than usual, and with some diminution of the white markings. It was resting, with its wings open and a shape of almost breath-taking beauty, just at the edge of the brightly shining maker's name-plate: which I believe was the real attraction, having regard to the well-known inquisitiveness of the species. The fortunate culmination followed; and it remains the finest net-caught specimen of this species that I have seen anywhere.

It must not be supposed, however, that the Emperor's choice of engine is solely for the internal-combustion variety. It must have a parading ground; and a railway will serve as well as a road. I have seen it settled on the lagging of a steam locomotive in Switzerland, and fly thence to settle on the glass of a closed compartment: and in one well-known Hampshire locality the railway line cutting the wood is its principal beat. As I think is also the case in a certain Somerset

wood. In Symonds Yat, when the species was still fairly numerous there—say up to the early 'twenties—it was frequently seen flying along the line, and was on occasion observed perched on the sleepers and even on the metals.

The Purple Emperor frequently gets itself run over on roads on the Continent, but I know of only one such instance in England. I do not know whether it ever immolates itself on the railway lines; but I do believe that some of the instances that occur from time to time of this species turning up in odd and unexpected places may be due to involuntary rides on trains.

I have mentioned it as on a window in Switzerland. There is a recent instance of a Purple Emperor having flown in by the open window of a house in Sussex. It has been recorded as finding its way inside a greenhouse. And I think that a taste for glass may help to account for the following incident in my experience which is even more remarkable than that of 1953. In July of last year, 1954, I halted my car in exactly the same position as in the previous year. Shortly after I did so, an Emperor swooped down, and having flown about the car for a few seconds fluttered down between car bonnet and wing: in a position where I could not get at it with my net.

It was up again in a moment, however, and after a preliminary beat at a closed pane, flew in at the driver's window of my car and then tried to come out again at one of the other windows on this side, which was fortunately permanently closed. I leaped to close the window of ingress: and then bounded to the other (the shaded) side to close the window there. When the Emperor was sitting still on the glass on the driving side for a moment, I cautiously opened the shaded side door, slipped in, and clapped my killing-bottle over it. The time was again 3.30 p.m. B.S.T.

One is tempted to wonder what further of the unusual, future years may bring.

'Belfield',
Burnham-on-Sea,
Somerset.
21st April, 1955.

UNUSUAL FOODPLANT OF *STENOPTILIA BIPUNCTIDACTYLA* (SCOP.). (LEP: ALUCITIDAE.)

Mr. Huggins has prompted me to record the discovery of a larva of *S. bipunctidactyla* feeding on the green seed pods of *Linaria vulgaris* at Worthing in late August. The larva is better known from the shoots and flowers of *Scabiosa* (Barrett and Ford) and on *Galium* (Leech).

G. HAGGETT.

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CYNIPIDAE (HYM.) FROM NORFOLK—I

By S. A. MANNING, F.L.S., F.R.E.S.

This paper records the results of a few years' collecting and breeding work in Norfolk. Some of the places named were not visited regularly, so it is likely that other galls will be found there. While teaching at Old Buckenham (1949-51) I was, however, able to search and collect almost daily during the school terms. Even so, several of the forms of the species exhibiting alternation of generations eluded me. As Felt (1940) puts it: 'The galls of one generation may be conspicuous and common, while those of the other may be uncommon or so inconspicuous as to be generally overlooked.'

The Oak galls were all found on the Pedunculate Oak, *Quercus robur* L. (= *Q. pedunculata* Ehrh.).

The nomenclature of the gall-makers is that of Kloet and Hincks (1945), except that *Adleria kollari* has been placed in the genus *Andricus* following the work of Marsden-Jones (1953).

Later work on the *Synergus* species has rendered Kloet and Hincks' list of these inquilines or 'guest flies' somewhat out-of-date, so Ross (1951) and Eady (1952) should be consulted.

Rhodites rosae (L.). 'Bedeguar' galls were found on Wild rose (*Rosa canina* L. agg.) at Caston, August, 1951 and 1952; Costessey, 25th August, 1951; Crostwick, 27th August, 1950, 16th June, 1951 (1), 18th August, 1951 (2); Drayton, August, 1949, 1950, 1951, 1952; Norwich, 9th September, 1954; Old Buckenham, 8th July, 1949 (3); Shipdham, 2nd September, 1952 (4); Sutton, September, 1952; Wheatfen Broad, 15th September, 1950. Insects emerged from the four gatherings indicated. From (1) individuals of *Rhodites rosae* (L.), *Torymus bedeguaris* (L.), *Periclistus brandti* (Ratz.), and *Orthopelma mediator* (Thnbg.) (= *O. luteolator*) emerged during June and July, 1951. A number of *Torymus bedeguaris* (L.) started emerging from (2) on 19th August, 1951. Gathering (3) yielded a solitary *Eurytoma rosae* Nees, while (4) produced one *Periclistus brandti* (Ratz.) and one ? *Habrocytus* sp. Imms (1947, p. 176) gives an excellent diagram showing the relationship between these different insects.

Rhodites sp. The leaves of Wild rose (*Rosa canina* L. agg.) bore smooth and spiny pea-galls at Caston, 1951 and 1952; Costessey, 1951; Crostwick, 1950 and 1951; Drayton, 1949, 1950, and 1951; Holt, 1952; Old Buckenham, 1949 and 1950; Shipdham, 1952; Sutton, 1952. Smooth pea-galls only were noted at Edingthorpe, 1950; Norwich, 1954; Shropham, 1952; Spixworth, 1950; Stow Bedon, 1952. Spiny pea-galls only were found at Wheatfen Broad, 1950. The earliest dates on which smooth and spiny pea-galls were observed at Old Buckenham, where I collected almost daily, were 26th June, 1950, and 19th July, 1949, respectively. In view of the

work of Niblett (1943, 1947) and the fact that I have not reared gall-wasps, I cannot say which species of *Rhodites* are responsible for these galls. I have had one *Eurytoma* sp. emerge from a spiny pea-gall from Drayton, 1949.

R. spinosissimae Giraud. Galls were found on leaves of *Rosa canina* L. agg. at Norwich, 9th September, 1954; Shipdham, 2nd September, 1952; Wilby, July, 1951. An example of *Eurytoma rosae* Nees emerged from the Norwich galls early in 1955.

Liposthenus latreillei (Kieffer). The globular galls were found on Ground ivy (*Glechoma hederacea* L.) at Banham, 17th June, 1951; Caston, August, 1952; Crostwick, 2nd August, 1951; East Harling, 19th June, 1951; Norwich, 9th September, 1954, 6th June, 1955; Old Buckenham, early June, 1949, 1950, 1951; Shropham, 21st June, 1951. Examples of *L. latreillei* emerged from galls collected at Old Buckenham, 13th June, 1951, early in April, 1952, some being active in the jar on the tenth of that month.

Aulacidea hypochoeridis (Kieffer). Galls were evident on stems of Cat's-ear (*Hypochoeris radicata* L.) at Crostwick, 23rd August, 1951; Old Buckenham, 20th June, 1950.

Xestophanes potentilla (Retz.). Galls were found on Creeping Cinquefoil (*Potentilla reptans* L.) at Caston, 12th August, 1951; Crostwick, 27th August, 1950; Holt, 2nd September, 1952; Old Buckenham, 20th June, 1950; Shipdham, 2nd September, 1952; Shropham, August, 1952.

Diastrophus rubi (Bouché). Galls were collected from Brambles (*Rubus fruticosus* L. agg.) at Old Buckenham, 26th March, 1949, 27th October, 1949, 30th January, 1951. I reared a number of *D. rubi*, several *Torymus macropterus* (Wlk.) and one *Eurytoma* sp. ? *mayri* from the 1949 galls. A number of *D. rubi* and *Torymus macropterus* (Wlk.) started emerging from the 1951 galls on 2nd May, 1951.

Biorhiza pallida (Olivier). The familiar Oak-apple galls were present on Oak at Caston, 1951 and 1952; Crostwick, 1952; Eccles, 19th June, 1951 (several *B. pallida* and numerous *Syntomaspis affinis* (Wlk.) = *littoralis* (Wlk.) syn. nov. emerged between 10th April and 4th May, 1952); Norwich, 1954, 12th May, 1955 (newly-formed galls); Old Buckenham, 11th May, 1949 (new galls); Shipdham, 1952; Sutton, 1952 (examples of *Syntomaspis affinis* (Wlk.) emerged from one of these galls); Thompson Water, 1st May, 1952 (several *Syntomaspis affinis* (Wlk.) emerged from these old galls on 2nd-3rd May, 1952.

Trigonaspis megaptera (Panzer). 'Pink wax galls' were quite abundant on twigs growing amongst grass near the earth about Oak stumps at Old Buckenham, 26th May, 1951. I reared examples of *T. megaptera* from these galls.

T. megaptera f. *renum* (Hartig). Galls were found on Oak leaves at Old Buckenham, 27th September and 25th October, 1949.

Andricus testaceipes Hartig f. *sieboldi* (Hartig). 'Red-barnacle' galls were collected from the prostrate stems of a small scrubby Oak amongst grass and very close to the earth at Old Buckenham, 25th October, 1949, and 23rd June, 1950. They were also found on Oaks in similar positions at Caston, August, 1952; Norwich, April, 1954 (one *sieboldi* emerged), and at another place on the outskirts of the City on 9th September, 1954; Stow Bedon, August, 1952; Sutton, September, 1952. A few *Synergus incrassatus* Htg., emerged from the Stow Bedon galls.

A. quercus-radici (Fabr.). 'Truffle' galls were found at Caston, August, 1952 (old gall); Old Buckenham, 23rd June, 1950, 24th May, 1951. The last-named galls yielded examples of *A. quercus-radici* and *Torymus erucarum* Schrnk.

A. quercus-corticis (L.). Three galls were found on the bark of an Oak sapling, near the base of the trunk, at Caston during August, 1952. Ten *Synergus gallae-pomiformis* Fonsc., emerged 18th-27th August, 1952. Galls from Sutton, September, 1952, yielded one *A. quercus-corticis*. Old galls were found at Old Buckenham, 28th October, 1949.

A. fecundator (Hartig). 'Artichoke' galls were found on Oak at Caston, August, 1951 and 1952; Costessey, August, 1951; Crostwick, August, 1950; Norwich, August, 1954; Old Buckenham, September, 1949, and 1st July, 1950 (Two *Synergus evanescens* Mayr emerged from the 1950 galls); Shipdham, September, 1952; Shropham, August, 1952; Sutton, September, 1952.

A. ostreus (Hartig). Galls were found on Oak leaves at Caston, 12th September, 1951, August, 1952; Costessey, 25th August, 1951; Crostwick, 25th August, 1950, 18th August, 1951; Drayton, 25th August, 1950 (one *Synergus albipes* Htg. emerged from this material); Norwich (3 localities in the City), August and September, 1954; Old Buckenham, September, 1949, July, 1950; Shipdham, 2nd September, 1952; Stow Bedon, August, 1952; Sutton, September, 1952. During the autumn, 1954, examples of *Synergus nervosus* Htg. and *Pteromalinae* sp. emerged from galls collected at Norwich on 25th August, 1954.

A. inflator Hartig. Galls occurred on Oaks at Caston, April, 1952; Norwich, 9th September, 1954; Old Buckenham, 16th October, 1949, 25th February, 1950, May, 1951; Thompson Water, 1st May, 1952; Wheatfen Broad, 15th September, 1950.

A. curvator Hartig. Galls were collected at Banham, 17th June, 1951; Caston, 12th September, 1951, April-May, 1952; East Harling, 19th June, 1951; Norwich, 9th September, 1954, 25th May, 1955 (the form on Oak leaves first noticed this year); Old Buckenham, May, 1950 (examples of *A. curvator* were bred from these galls), June, 1950 (one *Synergus rotundiventris* Mayr emerged from this material), 7th June, 1951; Shipdham, 2nd September, 1952; Thompson Water, 1st May, 1952; Wheatfen Broad, 15th September, 1950.

A. callidoma (Hartig). I have found but three of these galls, one at Caston, August, 1952; a second at Norwich, 25th August, 1954; third at Old Buckenham, 30th June, 1950. Eight *Synergus gallae-pomiformis* Fonsc. emerged from the Caston gall.

A. callidoma f. *cirratus* Adler. I saw the gall on the male catkin of an Oak at Old Buckenham during the early part of the summer of 1951.

A. quercus-ramuli (L.). The attractive gall-mass looking just like a large tuft of cotton wool was found on the male catkins of Oak at Old Buckenham, 23rd May, 1950, 4th June, 1951 (one *A. quercus-ramuli* emerged).

A. nudus Adler f. *malpighii* (Adler). I have found only two galls of this insect, one at Caston, 12th September, 1951, the other at Costessey, 25th August, 1951.

A. albopunctatus (Schl.). The galls were found in Oak buds at Earlham Park, Norwich, 25th May, 1955; Old Buckenham, 28th June, 1950, May, 1951.

A. seminationis (Giraud). The fusiform galls were attached to stems of male Oak catkins at Old Buckenham, 2nd and 20th June, 1950, and again in June, 1951. Thickened catkin stems found on Oak at Shipdham, 2nd September, 1952, may be the remains of this gall.

A. quadrilineatus Hartig. The small ovoid galls were found on male catkins of Oak at Earlham Park, Norwich, 24th May, 1955; Old Buckenham, 17th May, 1950 (one insect which emerged has been retained at the British Museum (Nat. Hist.) for further study), 21st-23rd May, 1950, 26th May, 1951.

A. solitarius (Fonsc.). Galls were found at Caston, August, 1952 (old and new galls); Earlham Park, Norwich, 28th August, 1954 (one *Synergus nervosus* Htg. emerged); Old Buckenham, 1st July, 1950, May, 1951 (one *A. solitarius* emerged); Shipdham, 2nd September, 1952.

A. kollari (Hartig). Marble-galls were present on Oaks at Banham, 17th June, 1951; Caston, 12th September, 1951 (U), August, 1952 (K); Crostwick, August, 1951, July, 1952; Drayton, 25th August, 1951; Eccles, 19th June, 1951; Norwich, August and September, 1954 (K); Old Buckenham, March, 1949 (P), 24th September, 1949 (R), 27th October, 1949 (R), 9th November, 1949 (R, U), 7th June, 1951 (K, R); Shipdham, 2nd September, 1952; Spixworth, 31st August, 1950; Sutton, September, 1952 (K); Thompson Water, 1st May, 1952. The letters K, P, R and U indicate that *A. kollari*, a parasite at present unidentified, *Synergus reinhardi* Mayr, and *Synergus umbraculus* Ol. respectively emerged from the galls indicated. The galls collected at Old Buckenham on 7th June, 1951, had yielded a number of *S. reinhardi* by July, 1951, and an example of *A. kollari* was alive in the jar on 21st August, 1951.

Cynips quercus-folii L. 'Pale cherry' galls were attached to the undersurface of Oak leaves at Beeston Regis, 23rd October, 1948;

Norwich, 25th August, 1954 (one *Decatoma biguttata* Swed. emerged); Old Buckenham, 28th October and 4th December, 1949 (fallen leaves); Stow Bedon, August, 1952; Sutton, September, 1952; Thompson Water, 1st May, 1952 (one *Torymus nigricornis* Boh. (= *regius* Nees = ? *nigricornis* Fab.) emerged from one of these galls, which were on last year's fallen leaves); Wheatfen Broad, 15th September, 1950 (a gall-wasp emerged indoors and was alive on 9th January, 1951).

C. divisa Hartig. Galls from which no insects emerged occurred on Oak leaves at Crostwick, 31st July, 1952; Shipdham, 2nd September, 1952. Galls collected at Old Buckenham, 22nd September, 1949, yielded one example of each of the parasites *Eupelmus urozonus* Dal., *Decatoma* ? *biguttata* Swed., and *Eurytoma rosae* Nees. From galls collected at Drayton on 25th August, 1951, a number of *Synergus albipes* Hartig emerged on 30th August, 1951. Some time between 10th April and late July, 1952, examples of *Synergus pallicornis* Hartig and *Synergus albipes* Htg. (= *tscheki* Myr) emerged from these galls. Examples of *Torymus nigricornis* Boh. (= *regius* Nees = ? *nigricornis* Fab.) were bred from the same material.

C. agama Hartig. Galls were found on Oak leaves at Crostwick, 25th August, 1950; Old Buckenham, July, 1950.

Neuroterus tricolor (Hartig). Galls occurred on Oak leaves at Old Buckenham, 12th June, 1950, and 13th June, 1951 (one example of *Pteromalinae* sp. emerged). Old galls were found at Caston and Stow Bedon during August, 1952.

N. tricolor f. *fumipennis* Hartig. 'Cupped spangle' galls were present on Oak leaves at Old Buckenham, 9th November, 1949; Stow Bedon, August, 1952.

N. albipes (Schenck). The minute galls were evident on Oak leaves at Caston, 12th September, 1951, August, 1952; Norwich, 25th May, 1955, and at another place in the City on 14th June, 1955; Old Buckenham, 23rd June, 1950, June, 1951; Shipdham, 2nd September, 1952.

N. albipes f. *laeviusculus* Schenck. 'Smooth spangle' galls were found on Oak leaves at Caston, 1951, 1952; Letton Hall, 1952; Norwich (3 localities), 1954; Old Buckenham, 1949; Shipdham, 1952; Sutton, 1952; Wheatfen Broad, 1950. They were collected during August and September.

N. quercus-baccarum (L.). 'Currant' galls occurred on male catkins of Oak (C) and on Oak leaves (L) at Banham (C, L), 17th June, 1951; Caston (L.), 12th September, 1951, late April, 1952; East Harling (C, L), 19th June, 1951; Eccles (C, L), 19th June, 1951; Norwich (C, L), 12th (L) and 19th (C) May, 1955; Old Buckenham (C, L), May-June, 1949, 1950, 1951; Shipdham (L), 2nd September, 1952; Shropham (L), 21st June, 1951. Examples of *N. quercus-baccarum* were bred from leaf and catkin galls taken at Old Buckenham, and the insects started emerging on 9th June, 1951, from

catkin galls collected two days earlier. Other insects bred from 'currant' galls included *Torymus auratus* (Fourcr.) from catkin galls gathered at East Harling, June, 1951; *Pteromalinae* sp. from catkin galls taken at Old Buckenham, May, 1950; *Torymus auratus* (Fourcr.) from leaf galls from Old Buckenham, May, 1950; *Pteromalinae* spp. from leaf galls from Old Buckenham, June, 1950; *Torymus auratus* (Fourcr.) and *Synergus nervosus* Htg., from leaf galls collected at Old Buckenham, June, 1951. A female *Synergus rotundiventris* Mayr was found in the packet containing leaf galls collected at Old Buckenham during June, 1950, but I am not prepared to state definitely that it emerged from a *quercus-baccarum* gall.

N. quercus-baccarum f. *lenticularis* (Olivier). 'Common spangle' galls were found on Oak leaves during August and September at Caston, 1951, 1952; Costessey, 1951; Crostwick, 1950; Drayton, 1950, 1951; Norwich, 1954; Old Buckenham, 1949; Shipdham, 1952; Shropham, 1952; Spixworth, 1950; Stow Bedon, 1952; Sutton, 1952; Wheatfen Broad, 1950.

N. numismalis (Geoff. in Fourcr.) The beautiful 'silk button spangle' galls were present on Oak leaves during August and September at Caston, 1951, 1952; Costessey, 1951; Crostwick, 1950, 1951; Letton Hall, 1952; Norwich, 1954; Old Buckenham, 1949, 1950; Shropham, 1952; Spixworth, 1950; Sutton, 1952.

N. numismalis f. *vesicator* (Schl.). Galls were found on Oak leaves at Banham, 17th June, 1951; Old Buckenham, 25th June, 1950 (several *Synergus albipes* Htg. emerged from these galls), and 7th June, 1951 (examples of *N. numismalis* f. *vesicator* emerged during July, 1951); Shipdham, 2nd September, 1952.

N. aprilius (Giraud). At 11 a.m. on 12th May, 1951, I watched a number of this species emerging from galled Oak buds at Old Buckenham. Gall-wasps emerged daily for several days. The gall was found at Caston on 24th April, 1952.

VICE-COMITAL DISTRIBUTION OF THE LOCALITIES MENTIONED:—

EAST NORFOLK (v.c. 27): Banham, Beeston Regis, Costessey, Crostwick, Drayton, Edingthorpe, Holt, Norwich, Old Buckenham, Spixworth, Sutton, Wheatfen Broad.

WEST NORFOLK (v.c. 28): Caston, East Harling, Eccles, Letton Hall, Shipdham, Shropham, Stow Bedon, Thompson Water, Wilby.

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It is a pleasure to thank Mr. R. D. Eady, Commonwealth Institute of Entomology, for considerable help with the identification of parasites and other insects, for advice on nomenclature, and for his encouragement generally. I am also very grateful to Mr. J. Quinlan, British Museum (Natural History), for identifying a large number of the insects from the galls and for checking the galls themselves. Mr. J. F. Perkins, British Museum (Natural History) is thanked for the identification of *Orthopelma mediator*. Books and papers from Mr.

M. Niblett and the libraries of the Royal Entomological and Linnean Societies have helped me greatly:

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249 *The Avenues*,
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MACROLEPIDOPTERA RECORDS FROM HAMPSHIRE.

Migrants and probable second brood individuals at Whitehill,
N.E. Hants., 1955.

Heliothis peltigera (Schiff.) ♀, 26.6.55. Fed on honey, sugar and glucose for three days. Died without laying any eggs.

Celerio galii (Rott.) ♀, 30.7 Fed on honey, sugar, glucose and sherry for seventeen days. Laid five infertile eggs.

Leucania loreyi Dup. ♂, 24.9. In very good condition and identified by Mr. A. L. Goodson.

The following belonged, I believe, to second broods:

Spilosoma lubricipeda (L.) ♂. Fresh condition. 23rd August.

Craniophora ligustri (Schiff.) ♂. Fresh condition. 24th August.

Bena prasinana (L.) ♀. Fresh condition. 24th August.

Diacrisia sannio (L.) ♂. Fresh condition. 27th August.

Ellopiia prosapiaria (L.) (*fasciaria* (Schiff.)) ♂. Fresh condition. 30th August.

Comacla (Mitochrista) miniata (Forst.) ♂. Fresh condition. 20th September.

Hadena serena (Schiff.) ♂. Fresh condition. 24th September.

Lycophotia porphyrea (Schiff.) (*varia* (Vill.)) ♀. Fresh condition. 25th September.

DAVID WRIGHT.

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Bordon, Hants. 11.10.55.

NOTES ON A BROOD OF
SYMPETRUM FONSCOLOMBEI (SELYS)
(ODONATA, LIBELLULIDAE)

By B. P. MOORE, D.Phil., F.R.E.S.

Sympetrum fonscolombei (Selys) is one of the most interesting of our migrant dragonflies, for it appears to reach its northern limits in our islands. The species has undoubtedly bred with us on occasion and there are a few authentic records of successful overwintering in the larval stage (Longfield, 1949). However, so far as is known, no British colony has persisted for more than a few consecutive seasons and we are therefore dependent on periodic immigrations from the Continent for the continued existence of the species here. Most probably the small size and scattered distribution of the occasional breeding colonies combine to limit their success before the irregularities of our climate deliver the *coup de grâce*. The precise nature of the limiting factors must, however, remain uncertain until the bio-nomics of the species have been fully worked out.

Recently I had the opportunity to breed a series of *fonscolombei* from the egg, under conditions approximating to those of an average English season. My observations were by no means exhaustive, but the results do appear to throw some additional light upon the breeding status of this species. I therefore propose to summarize them briefly in the following notes.

The female parent, somewhat immature, was captured on 4th June, 1954, at Canet Plage on the French Mediterranean coast. She survived the long journey home in a closed suitcase, and within a few hours of release in my study (on 6th June) commenced to lay a large batch of eggs. These were deposited singly in a small dish of pond-water provided for the purpose, and they remained separate for a short while before the rapidly swelling outer covering caused them to coagulate into a dense mass. Altogether about fifty eggs were obtained before the female died on the following day.

The eggs were placed in an unheated room facing west, where they were subjected to temperatures ranging between 15° C (59° F) (night) and 22° C (72° F) (day). Within seven days the development of larval eyes was apparent and hatching commenced on the nineteenth day (25th June). A few pronymphs were observed, but their duration was a matter of minutes only. They did not appear to differ significantly from those of other *Sympetrum* species. A number were unable to extricate themselves from the sticky egg-matrix and were lost. Thus only about thirty second instar larvae were obtained. These were divided between two petri-dishes and provided with a strong culture of infusoria. The young larvae were extremely active and they fed readily, but no cannibalism was observed. From this point domestic arrangements compelled me to confine my observations to

the week-ends, and I therefore made no attempt to follow the stage-by-stage progress of individual larvae.

By 6th July many of the larvae had moulted and a number of deaths had to be recorded. The following week-end saw many in the fourth instar, and at this stage the total stock was further divided between eight two-ounce jars. *Cyclops* and *Daphnia* spp were provided as food and progress continued apace. By the end of July many larvae had reached the seventh and eighth instars and the difference in size between these and the laggards was most striking. Mosquito larvae were next provided, but the voracity of the young Odonata made it impossible to maintain a high food density in the aquaria throughout the week. This limitation undoubtedly retarded the progress of the more active larvae and resulted in considerable cannibalism. Eventually, only a single larva remained in each jar!

The beginning of September brought an exceptionally cold autumnal spell and this resulted in a serious lowering of the water-temperatures (12°C night- 17°C day). Nevertheless the first full-grown (twelfth instar) larva was obtained on the fifth of the month and this produced a male imago on 10th October, one hundred and twenty-six days after the deposition of the egg. This was followed by two female imagines which emerged on 17th and 28th October, respectively. The cold weather persisted throughout the autumn months, and the last emergence of the year (a male) took place on 20th November.

The remaining four larvae continued to feed through the early winter, although the water-temperature frequently fell to 9°C (48°F), and the last to attain maturity did so on 23rd January, 1955. February saw the full force of winter weather and the night-temperatures of the little aquaria averaged 4.5°C (40°F), i.e., a figure comparable with that to be expected at the bottom of a partly frozen pond. This caused the death of two larvae. March was also cold, but, to my surprise, a female imago emerged successfully on the 13th of the month in an air-temperature of only 10°C (50°F). The last remaining larva continued to feed during the early spring and attempted to transform on 14th April.

The full-grown larvae ranged in length from 17 mm. to 19 mm. (including anal appendages but excluding antennae), but the reared adults were mostly undersized. Details of the setal armature of the masks (labia) are given in the table. From these it will be apparent that variation was considerable and bilateral asymmetry rather frequent. The average setal formula would appear to be 13+13 to 14+14, palpal, and 17+17 to 18+18, premental. Similar figures are given by Longfield (1946) and Gardner (1951).

My observations tend to confirm the view that *S. fonscolombeii* is capable of breeding in Britain in some numbers in favourable seasons. Teneral specimens which are seen occasionally in the late summer months would appear to be home-bred progeny of early-summer

LARVA	PALPAL SETAE		PREMENTAL SETAE	
	LEFT	RIGHT	LEFT	RIGHT
1	13	14	17	17
2	13	13	17	17
3	13	14	18	17
4	13	13	18	18
5	13	13	17	16
6	13	14	18	17
7	13	13	19	17
8	14	15	19	17

Setal formulae of full-grown larvae of *S. fonscolombeii* (Selys).

migrants; whereas early-summer teneral may well have overwintered here as full-grown larvae. In the latter connection it is interesting to note that the temperature-tolerance of the larval stages varies between wide limits, for the brood reared by Gardner (1951) from Malta stock were markedly more sensitive to cold than were my own. Larvae derived from the northernmost breeding populations are the most likely to survive our winter conditions, albeit in small numbers.

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SYMPETRUM FLAVEOLUM (L.) IN SUSSEX AND SURREY. (ODONATA: LIBELLULIDAE)

One male was taken at Rye, Sussex, on 15th August, 1955. About seventy males were counted on a rushy pond on Wimbledon Common, Surrey, on the 2nd and 3rd September. Specimens were still numerous up to the 17th, when a prolonged collecting trip prevented further observations. At Wisley, Surrey, about twenty males were seen on the 9th September. I have also received reports of numerous males at Woolmer, Hants., and the Berrow sandhills, Somerset. From the latter locality Mr. J. Cowley saw and secured one female. Eggs were obtained and kindly sent to me. The majority of eggs hatched between 12th and 16th October.

It would appear that the 1955 invasion has been the most prolific since 1945, but there is at the moment little evidence that *flaveolum* continued to migrate northwards.

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OBSERVATIONS ON THE BRITISH AGROMYZIDAE (DIPT.)—II.

RECORDS OF AGROMYZIDAE (DIPT.) IN SCOTLAND

R. By KENNETH A. SPENCER, B.A., F.R.E.S.

With the kind permission of Mr. A. Rodger Waterston, of the Scottish National Museum, Edinburgh, I have recently checked the Agomyzidae in the Edinburgh collection, which consisted for the greatest part of undetermined material collected by J. R. Malloch, mostly in Dumbartonshire in the late 1890's.

The collection contained a number of species not previously recorded in Britain, some of which will certainly prove to be confined to Scotland. In view of the interest of Scottish records when considering distribution in the British Isles, it is proposed to give below a complete list of the Scottish species in the collection, with additional comment where necessary. The generic arrangement follows Frick (1952).

Agromyza Fallén

A. intermittens Beck. New to Britain. A single specimen, no exact data. This species is a grass-miner and is widespread throughout the Palaearctic region, but occurs locally.

A. ocellaris Hd. New to Britain. An uncommon species, previously only reported from Italy. Biology unknown.

Also: *albipennis* Mg., *ambigua* Fall., *anthracina* Mg., *lucida* Hd., *mobilis* Mg., *nana* Mg., *nigripes* Mg., *nigrociliata* Hd., *reptans* Fall., *rubi* Bri., *spiraeae* Kalt.

Melanagromyza Hendel

M. cunctata Hd. New to Britain. A single specimen. Widespread throughout Europe from Scandinavia to Spain. I have recently bred the species from mid-rib mines on *Taraxacum officinale* agg., found at Blackgang, I-o-W., closely resembling those of *M. pulicaria* Hd. Mines containing puparia found on 12th September, 1955, produced flies two weeks later. Hendel (1936) states that there is probably only a single generation, but it is now clear that there are two generations, with the first generation of flies appearing probably late in July.

I have now re-examined the specimen which I referred to *M. beckeri* Hd. (Spencer, 1953), and I am satisfied that this is also *cunctata* Hd. *M. beckeri* Hd. must therefore be deleted from the British list.

The exact host relationship of *M. cunctata* Hd., *beckeri* Hd. and also *pulicaria* Hd. requires clarification by further breeding. Records now known are: *M. cunctata* Hd.—*Taraxacum* and *Sonchus*; *M.*

beckeri Hd.—*Hypochaeris* and *Leontodon*; *M. pulicaria* Hd.—*Taraxacum* and *Sonchus*.

Also: *lappae* (Mg.), *pulicaria* Hd.

Ophiomyia Braschnikov

O. labiatarum Hd. New to Britain. A single specimen. Originally bred by Dr. H. Buhr from stem-mines in *Stachys silvatica* L. in Mecklenburg.

O. melandryi de Meij. New to Britain. A number of specimens. Occurs throughout Northern Europe. Bred by Kaltenbach and De Meijere from stems of *Melandryum silvestre* Schrk.

Also: *maura* Mg., *proboscidea* Str.

Tylomyza Hendel

T. pinguis (Fall.).

Phytobia Lioy

P. (Poëmyza) cingulata (Zett.). New to Britain. A single specimen. An extremely rare species of which the only other specimens known are the types from Lapland. Hendel did not include this as a good species in his Monograph (1936), but the type has recently been redescribed by Rydén (1951). Biology unknown.

P. (Poëmyza) lateralis (Mcq.). New to Britain. A single specimen. A grass-miner widespread throughout Europe.

Also: (*Phytobia*) *carbonaria* (Zett.), *errans* (Mg.); (*Poëmyza*) *incisa* (Mg.), *muscina* (Mg.), *pygmella* (Hd.); (*Icteromyza*) *capitata* (Zett.); (*Calycomyza*) *humeralis* (v. Ros.); (*Trilobomyza*) *flavifrons* (Mg.); (*Praspedomyza*) *hilarella* (Zett.); *monfalconensis* (Str.); (*Dizygomyza*) *iraeos* (R-D.), *luctuosa* (Mg.), *morosa* (Mg.).

Cerodonta Rondani

C. atronitens Hd., *denticornis* Pz., *fulvipes* Mg.

Liriomyza Mik

L. orbona Mg. f. *infusata* Hg. New to Britain. This species was sunk by Hendel (l.c. p. 237) and synonymized with *orbona* Mg. Hering still considers it to be a good species, differing from both *orbona* Mg. and *orbonella* Hd. by the black base of the antennae; furthermore, its short, almost semi-circular ocellar triangle would in any case associate it rather with *orbonella* Hd. than with *orbona* Mg. The biology of these species is unknown; more material is required, and if possible a clarification of the biology, before their exact systematic relationship can be determined.

Also: *flaveola* Mg., *lutea* Mg.

Metopomyza Enderlein

M. alpicola Hd. New to Britain. A single specimen. This is a particularly interesting record, as the species has previously only been reported from the Austrian Alps. Biology unknown.

Also: *flavonotata* H.

Phytoliriomyza Hendel

P. perpusilla (Mg.) f. *halterata* Beck. New to Britain. Hering has recently expressed the opinion that *halterata* Beck. is a good species.

Phytagromyza Hendel

P. flavocingulata (Str.). New to Britain. A single specimen. A grass-miner, recorded from various localities in Northern and Central Europe, but local.

Also: *orphana* Hd.

Napomyza Haliday in Westwood

N. elegans Fall., *glechomae* Kalt., *lateralis* Fall.

Phytomyza Fallén

P. affinis Fall., *albipennis* Fall., *atricornis* Mg., *crassiseta* Zett., *fallaciosa* Bri., *flavicornis* Fall., *ilicis* Curt., *nigra* Mg., *nigripennis* Fall., *nigritella* Zett., *ramunculi* Schnk., *robustella* Hd., *rufipes* Mg., *tenella* Mg.

The writer would also like to record here the following species either taken as adults or observed in the leaf-mine stage during visits to Edinburgh and Aviemore in early June, 1953, and to Killin, Perthshire, in August, 1955.

Edinburgh.

Agromyza nigrescens Hd.; *Phytomyza anthrisci* Hd., *chaerophyli* Kalt., *minuscule* Gour.

Aviemore.

Agromyza johannae de Meij.; *Phytogromyza lonicerae* (R.-D.); *Phytomyza cineracea* Hg.

Killin.

Phytomyza rydéniana Hg. New to Britain. A species confined to *Cirseum heterophyllum* (L.) Hill and recorded only from Scandinavia and mountains in Central Europe. A characteristic linear mine is formed with conspicuous thick frass deposited at wide intervals. The larval mine occurs in July/August, producing the adults in the following June (Hering, 1949).

Also: *Phytobia* (*Trilobomyza*) *labiatarum* Hd.; *Liriomyza strigata* Mg., *taraxaci* Hd.; *Metopomyza violiphaga* Hd.; *Phytomyza alpina* Groschke (in litt.), *corvimontana* Hd., *heracleana* Hg., *leucanthemi* Hd., *lappina* Gour., *primulae* R.-D., *sonchi* R.-D.

I would like to express my thanks to Prof. E. M. Hering for confirming the determination of a number of species mentioned in this paper.

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11 Christchurch Hill,
Hampstead, N.W.3.
10th October, 1955.

BOOK REVIEW

Life in Fresh Water, by E. S. Brown, 1955. Pp. 64, 1 coloured plate, 200 text figures. Oxford University Press, London. Price (in U.K. only), 10s. 6d.

This excellent little publication will appeal chiefly to the young biologist and those who desire to know the 'whys and wherefores' of freshwater life. Specialists will, no doubt, criticise the fact that there are omissions regarding interesting species and special adaptations for life in freshwater, but when it is considered the vast multitude of organisms which claim consideration, the author is to be congratulated on selecting and describing such a variety of plants and animals in the modest space available.

The properties of water, respiration, food and its capture, locomotion, reproduction and life-histories are but a few of the aspects which are graphically described and illustrated. There are notes on classification, methods of study, keeping an aquarium, and a list of books suggested for more detailed study.

It is unfortunate that an index has been omitted; this is the only criticism for an otherwise well written, clearly illustrated and informative work.

A.E.G.

LITHOPHANE LAPIDEA HÜBNER BREEDING IN ENGLAND?

AN ACCOUNT OF A SHORT VISIT TO THE ISLE OF WIGHT

By ROBIN MERE

For some years I have wished to capture and breed *Rhodometra sacraria* (L.). When Mr. Eldon Ellison stated at a meeting of the South London Entomological and Natural History Society, on 13th October, 1955, that he had recently taken a number at Freshwater, Isle of Wight, I determined to try once again for this species, because by good luck this locality happened admirably to fit in with my movements. I had business in Lymington on the following Monday, 17th October, and could combine business with pleasure. Mr. Ellison kindly gave me precise directions, but it was rather discouraging to learn that he had found the insect so long as nearly two weeks previously.

I was unable to start until early on Sunday, 16th, when, accompanied by Mr. David More, we set off from Chiddingfold by car, complete with portable mercury vapour generator, Robinson type traps, etc. Crossing to the Island by the Portsmouth-Fishbourne car ferry, we had a fine view of the Russian cruisers then visiting Portsmouth.

We had in mind to investigate if *Sedina buettneri* Her., was still extant in the Freshwater marsh, and we also wished to try to take *Lithophane lapidea* Hübn. This insect was first recorded in Britain by Dr. Blair (Entom. **85**:123), who took one in his house at Freshwater Bay on 26th October, 1951, at light. Mr. Ellison had taken two at Eastbourne in 1954 (Entom. **88**:9), and again took it this year. It seemed likely that it was breeding at Eastbourne, and if at Eastbourne, why not in the Freshwater area? More and I discussed matters, and decided we would try to organize a plug-in for the mercury traps from a hotel or house with plenty of Cypress trees in the garden, Cypress being one of the food-plants of *lapidea*, and much planted in gardens in the Freshwater area.

We were unfortunate. After a long spell of warm weather, there was a heavy frost on the night of 15th October. This may well have killed what *sacraria* still survived. Though Sunday, 16th, was sunny and fine, some hours dragging and walking in the stubble field indicated by Mr. Ellison and in other stubble fields was quite unproductive. But then we had luck. We found accommodation that was still open (most hotels and boarding-houses close at the end of September, or even earlier when the 'season' ends), and which had Cypress trees in its garden. Having booked for the night, I stated we were moth collectors, and asked if we might run a moth trap in the garden, with a lamp connected to their main electricity. This

question was answered by an astonished 'What, more of you? Why, you've only just missed two others doing just the same'. And we found that Dr. Kettlewell and Mr. Goodson had left that morning after a stay of some days.

We set up traps in the grounds close to a number of Cypress trees, and were aided by a length of electric cable belonging to mine host, which had been used by Dr. Kettlewell and was still lying by a path.

After further vain attempts to find *sacraria*, we returned and switched on the traps. Then we drove over to the marsh, where we set up the portable generator and mercury vapour lamp. It had by now clouded over, but was cool owing to an intermittent north-west wind. We spent some three to four hours in the marsh, taking one *Dasypolia templi* (Thumb.), but nothing else of note. *Rhizedra lutosa* (Hübner) was variable and very abundant. No moth came to sugar, but ivy blossom produced a number of common insects, including two *Aporophyla nigra* (Haw.). On searching street lamps, we saw, some 16 feet up on a tall lamp standard, a moth that appeared to be *templi*. Casting nets, clods of earth and small stones failed to move it, and we wondered how to dislodge it till we saw a fisherman cycling home. With his rod we were able to prod the moth, which fluttered down. After all this it proved to be *lutosa*. I have often been asked when out with a net if I were going fishing. Now I know the complete entomologist should carry a fishing rod with him!

As we returned to our abode, we could see Cypress trees brilliantly lit up by our two mercury vapour lamps in traps, and we thought there was some chance that we should find *lapidea* in them. It was not to be. An examination of the traps about 10 p.m. showed very little contents and, weary, we went to bed, hoping the night would turn warm and that there would be a good morning flight.

Our hopes were fulfilled. On examining next morning the contents of the traps and the surrounding herbage, a large number of moths were found: 2 *templi*, 2 *Eumichtis lichenea* (Hübner), and, believe it or not, one lovely *lapidea*.

If it had not been for my business at Lymington we would have contrived to stay another night. But I suppose that if it had not been for that same business we might never have gone to the Isle of Wight at all.

Bearing in mind, first, that the trap containing our *lapidea* was more or less surrounded by Cypress trees; secondly, the known facts about the capture of the other specimens; and, thirdly, that I have reason to believe another specimen was taken this year in the Isle of Wight near Cypress trees, it seems certain to me that the species is breeding in this country.

A drive round the Freshwater area showed that there are some hundreds of Cypress trees in the grounds of hotels and in private gardens. It is not unreasonable to assume that this southern European

moth was introduced with some imported plant or tree, and has established itself in a warm sheltered district where a food-plant is plentiful. Nevertheless it must be either a very rare or a very sluggish insect, else it would surely have strayed as far as the marsh, and been taken by some of the many collectors seeking *buettneri* during the last ten years in late September and early October. There is in fact one garden at the edge of the marsh with a number of Cypress trees, within 30 feet of which I and friends have run a mercury vapour lamp for *buettneri* on at least twenty nights to my knowledge in recent years. And none of us found *lapidea* then. I do not think we would have passed it over.

Perhaps it is confined to a few trees in the one particular spot we were fortunate enough to choose, and does not stray at all from there except in unusual circumstances.

Chiddingfold, Surrey.

19th October, 1955.

BOOK REVIEWS

Catalogue of the Type Specimens of Microlepidoptera in the British Museum (Natural History) described by Edward Meyrick. By J. F. Gates Clarke. Volume II, 531 pp., 263 plates. Published by the Trustees of the British Museum (Natural History). Price, £6.

An account of the scope of this Catalogue and a Review of Volume I, which is virtually the Introduction, appeared in the July issue of the *Ent. Gazette* (Vol. 6, pp. 180-182). With the publication of Volume II we have the first of the volume illustrating the actual type specimens of species described by Meyrick. It deals with the three families Stenomidae, Xyloryctidae and Copromorphidae.

The greater part is taken up by the American family Stenomidae. The Xyloryctidae include species from America, Africa, Australia, China, India, Java, Madagascar, New Guinea and the Philippines; and in the Copromorphidae are species from America, Australia, Borneo, China, Fiji and New Guinea.

The outstanding feature of Volume II is the 263 plates of photographic illustrations and drawings of wings, genitalia, labial palpi and wing venation of nearly 1,000 species and genera. The methodical arrangement of the illustrations has resulted in a set of plates of unusual and pleasing uniformity, which users of the Catalogue will appreciate. Since superficial as well as structural characters of the species are shown the Catalogue will enable the general collector to determine material, besides supplying the more detailed information required by the specialist.

Previously it has been almost impossible to determine many of the species in these three families, particularly in the Stenomidae, which are exceptionally difficult due to the number of species and the superficial likeness of many of them. Over 600 species had been lumped

together in the genus *Stenoma* Zeller alone, a large proportion of them being unrecognizable from the original description and suspected of being wrongly placed generically. The illustrations in this Catalogue successfully bring from obscurity the identity of many of these species in the families Stenomidae, Xyloryctidae and Copromorphidae. The identity of a few species may still be uncertain, but this will not be a fault of the plates, which are beautifully reproduced, but will be for some other reason, such as the poor condition of the type specimen or the failure of the original photomicrographs to show sufficient detail of the genitalia structure, as occasionally happens.

It is disappointing that a natural classification could not be followed in the Catalogue; instead, the genera and species are arranged alphabetically within the families. The advantage of this arrangement is unfortunately lost because the author has transferred a number of species to other genera without inserting cross references or providing an Index. No doubt an Index to the complete work will appear with the final volume, but even so cross references to new generic combinations would have been advantageous to users, since they would have practically eliminated the need for an Index.

A Catalogue of this description is something new in the field of microlepidoptera. It provides in Volume II an excellent example of how photography and photomicrography can be utilized to aid in the dissemination of information on types. In this it strongly supports the proposal made at the 1953 meeting of the General Assembly of the International Union of Biological Sciences to form a central repository for photographs of type specimens, as a practical means to meet the demand for information on types.

J. D. BRADLEY.

Die Schmetterlinge Mitteleuropas. By Dr. W. Forster and Prof. Th.A. Wohlfahrt. Vols. 1 and 2. 1954-5. Vol. 1, £2 6s. Vol. 2, £5.

This fine work, which commenced publication in parts during 1954, has now reached the completion of its second volume and is available nicely bound in cloth. The main reason for the disparity in price between vols. one and two is that the second volume contains twenty-eight very fine coloured plates illustrating the Rhopalocera and including the Hesperidae. These plates are of such high grade that they would be well worth the cost of the volume without the text. The text is well arranged and of the utmost value; references to the plates on which the species is illustrated are given immediately after the name of the species—but why, oh why, are we not given references to the text page numbers in the plate captions? These plate captions are well placed facing the figures and rarely take up the whole of the pages (often there is two-thirds of the page blank). It would have taken little extra time or trouble to have included the page references and greatly to have increased the utility of the book. It is a puzzle to your reviewer that this is so seldom done. The

reference required is just as often from plate to text as from text to plate!

The first volume is devoted to *Biologie der Schmetterlinge* and is one of the most complete works of its type yet published. It ranges from Catching, Breeding and Preparation of specimens and the apparatus needed, to the anatomy and morphology of the insect in all its stages, parasitism, geographical distribution, systematics, nomenclature, etc. Genetics are briefly discussed, and there is a very interesting chapter on the descent and derivation of the Lepidoptera.

When completed this should become a standard work of reference, and certainly all European Lepidopterists owe a debt of gratitude to Dr. Walter Forster for his very able text, and to Prof. Wohlfahrt for his beautiful illustrations.

E.W.C.

Dwellers in Darkness: an Introduction to the Study of Termites, by S. H. Skaife. (Longmans Green, 25s.).

As the title of the work suggests, this is a book for general reading, but the author has done a great deal of original and important research and his discoveries deserve to be taken seriously by entomologists. Indeed, this is a work of real significance.

The Isoptera are divided into five families, of which the highest, the Termitidae, contains over three times as many species as the other four combined. It is with one of the species of the Termitidae, the Black-Mound termite (*Amitermes atlanticus*), found in South Africa, with which Dr. Skaife's investigations are mostly concerned.

Owing to the nature of their lives, the Isoptera are difficult to study in detail, especially as they are very delicate insects and are hard to keep alive in the laboratory. But Dr. Skaife has devised some ingenious pieces of apparatus which have enabled him to observe them closely and carefully, and it is this diligence, combined with his general knowledge of the subject, which gives to the book its special value.

Termites are among the most ancient of insects, their fossil history going back nearly three hundred million years, and they have evolved, as is well known, an elaborate social system. The Black-Mound termites, for instance, not only have a queen and king, but secondary and even tertiary queens and kings ready to take over in an emergency. Unlike the tropical termites, the Black-Mound variety live in relatively small colonies, a big one containing not more than about fifty thousand insects, but as their mounds are wide-spread, and as the insects eat something like five hundred times their weight during a year, they have a very considerable effect upon the dead vegetation.

Dr. Skaife has much to tell us about their 'guests' and parasites. Among the former are a solifuge, a spring-tail, a beetle, mites, and a fly of a new genus and species, belonging to the *Sarcophaginae*, to which has been given the name *Termitometopia skaifei*. As for the parasites, while the Black-Mound termites do not have their gut full

of protozoa, sometimes to a weight of a third of the insect, as do the wood-eating termites, they often have, in very small numbers, a parasite peculiar to this genus called *Nyctotherus silvestrianus*. It does little, if any, harm apparently, but it is not a symbiot, as are the cellulose-consuming parasites of the wood-eating termites.

Dr. Skaife calls the theories of Maeterlinck and Marais, that all the different individuals of a termitary are really one composite animal, 'just nonsense', but though as a trained observer and a skilled entomologist he is on safe ground, yet he admits that the question of control is full of problems as yet unsolved. He is of opinion that the work of the termites is probably 'as highly organized and strictly controlled as that found in the beehive', but these 'dwellers in darkness' keep their inner secrets very much to themselves.

Fourteen admirable plates, illustrated on both sides, and numerous useful illustrations in the text add to the quality of this fascinating volume.

RICHARD CURLE.

A study of the insects living on the wayfaring tree, by K. C. Side. 1955, *Leaflet AES*, no. 25: 1-20. Price, 1s. 6d.

In this study the author presents the results of some personal observations made on the insect fauna of wayfaring trees in Kent. The original data given are interesting, but unfortunately the work is so badly constructed that it becomes almost impossible to disentangle original work from that of others: in few places are the actual numbers of any species observed given, and thus the paper presents a series of impressions rather than of statistical probabilities. Nevertheless, a valuable contribution to the biology of a number of a species, e.g. *Galerucella viburni*, *Lithocolletis lantanella*, is given.

The author has elucidated a complex food-chain which, although it can be faulted in minor details, presents a fascinating picture of the insect ecology of the host. It is suggested that *Anthocoris nemorum* preys upon mites; this is possibly so, but *Anthocoris* spp. also at times prey directly upon aphids. *Troilus luridus* has been observed feeding upon adult *Galerucella*; there can be no doubt that *T. luridus* feeds much more often upon larvae than upon adults. The principal enemies of this predatory shieldbug are parasitic Diptera, Phasiinae. One important conclusion reached by Mr. Side is that the most valuable pollinating agents are beetles, especially *Anaspis* and *Meligethes*.

Would the editor of the series please assist librarians and others by putting the journal's title in full on future publications?

DENNIS LESTON.